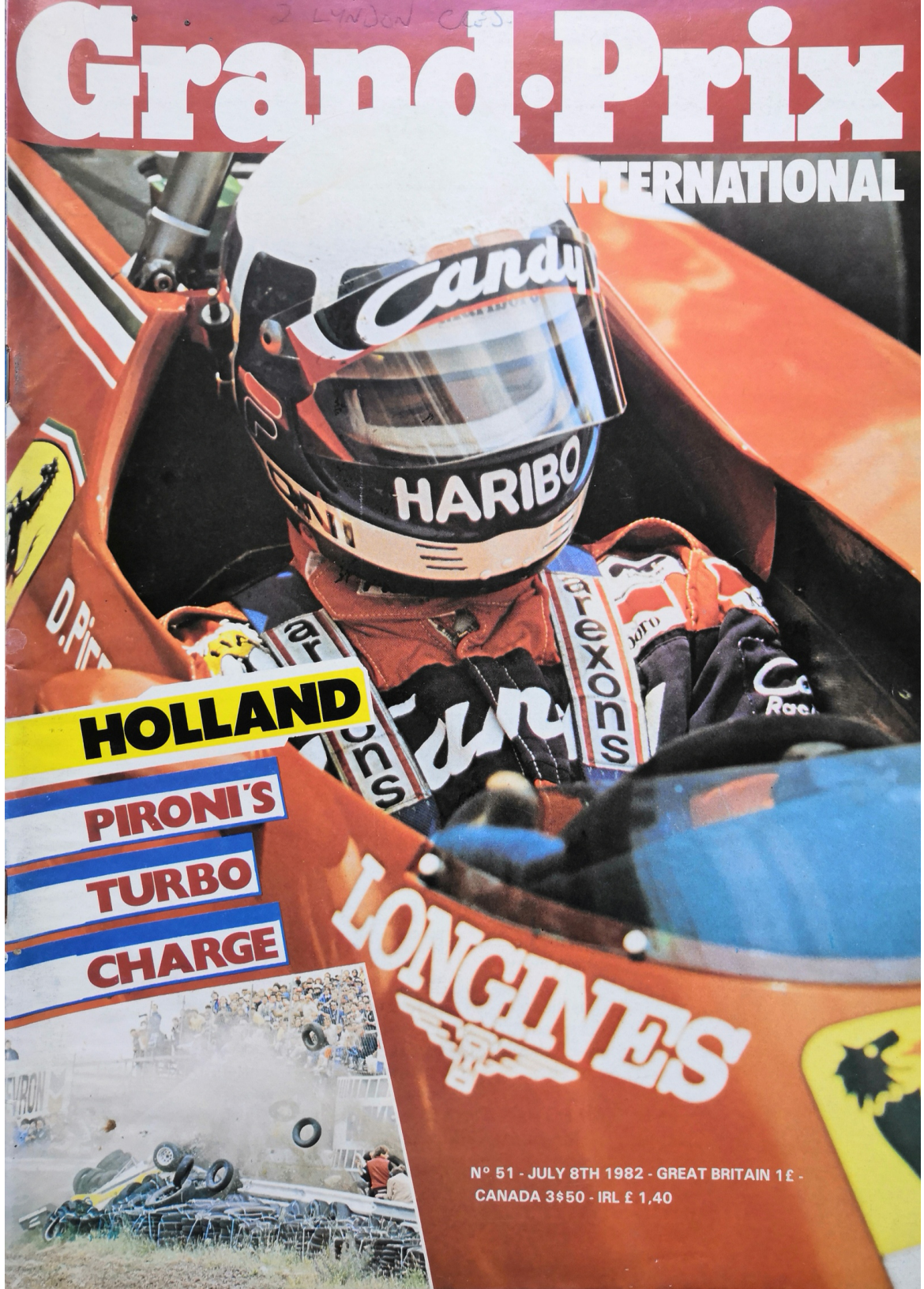
Grand Prix

INTERNATIONAL



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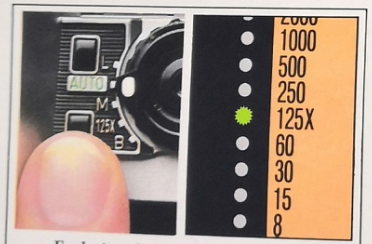

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LONGINES

A Matter of Style

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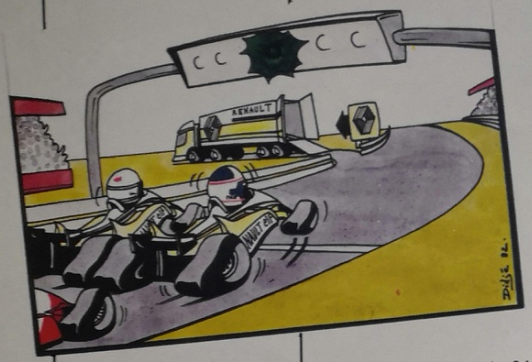
The paddock in Zandvoort



MANSELL IN PAIN

His left arm hurt so much after his collision with Bruno Giacomelli at the Canadian Grand Prix that everyone thought it was broken. It wasn't so, but Nigel's pain was none the less for that.
In fact, his hand was caught in the spokes of his wheel as it made a sudden twist and a similar violent twist distorted the whole articulation of his elbow. His elbow was first plastered while also being packed with ice every three hours. The plaster has been taken off, but Nigel still wears a plastic mould and does intensive physiotherapy and gymnastics to speed up his recovery.
"They gave me the toughest and most sadistic nurse in the whole hospital," he boasted as he expressed his hope to be back in shape for Brands Hatch.
There was no question of his racing at Zandvoort. He stayed behind in England.
His place was taken by the 23-year-old Brazilian hopeful Roberto Moreno, who currently leads the Brazilian Formula 3 championship. Moreno had signed to test-drive for Lotus at the start of last season. Our colleague Bob Constanduros has more to say about Roberto and his rather unhappy week-end in Extra, Extra.

SON OF "GRAND PRIX"

John Frankenheimer produced the classic film "Grand Prix" in the mid-1960s, still a seat-gripper during its regular TV reruns. He told GPI he is preparing a new, 10-12 million dollar film called simply "Speed", set in the Grand Prix and Le Mans worlds.
"The scenario differs from Grand Prix in being concentrated on a driver and his story, rather than the pattern of a racing season. The driver is a man who seeks to fulfill himself as a human being, and who regularly competes in Formula 1 and Le Mans. He is about 40 and has already won the 24 Hours three times ; he is an American living in Europe who is reaching the end of his Grand Prix career. The film will also highlight a driver of about 30, German, French or English, and 80 per cent of the film will be shot on location, during the Grands Prix. My co-producers", he added, *"will be Bernie Ecclestone and Bernard Cahier"*, the latter a veteran racing journalist.

THE BEST OF LE MANS

A special English-language issue of GPI dedicated to the Le Mans 24 Hours has had an enthusiastic reception among Formula One addicts. With 96 pages and over 150 photos in full colour, it traces all the ins and outs of what many think of as still the world's number one race. Ten double pages of extraordinary pictures cover this most photogenic of all races. Bernard Asset, DPPI, Vandystadt, First Line and many others provide the illustrations while our experts Didier Braillon, Bob Constanduros and Mike Doodson made the rounds of almost all the competitors to provide the fullest possible coverage. Look for it at your regular news agent.

ATS BRAKE

The ATS team had a lucky escape on the Wednesday before the Grand Prix. An Agip tanker truck, parked 15 yards away across the paddock, quite suddenly rolled slowly backwards and into their transporter. The driver had left the handbrake off, and the heavy vehicle came to a halt against the transporter's tailgate. Remarkably, the lowered tailgate was undamaged and so was the truck, but if it had been two yards to either side, it could have written off the whole racing team.

WEBB ON F1 COMMISSION

John Webb, who runs Brands Hatch and the other MCD circuits in Britain, has been elected to FISA's Formula One Commission to join Maurice Belien of Zolder as the representatives of the European F1 tracks. He was supported by all 10 European countries involved.
Webb is also president of the Circuits International, the group which 40 international circuit owners have formed to have a united voice in motor sporting affairs.
GPI congratulations to a real pro !

THE 'MILK-BROTHER'

Greg 'Pee Wee' Siddle is little known in the world of Formula One, but at Zandvoort, his two drivers were practising together for a Grand Prix for the first time. Pee Wee, a mustachioed Australian, has run a number of drivers since he first came to Europe, including Larry Perkins and Geoff Brabham. In 1977, he was approached by Nelson Piquet who wanted Pee Wee to run him in F3 in England, a campaign which ended in a Formula 3 title and subsequently the Brabham Formula One drive. When Nelson's friend Roberto Moreno arrived in Europe, it was Pee Wee who was asked to handle his career.
'The Milk Brother' as the two Brazilians call him, went on to run Moreno in Formula Ford with Van Diemen, and was surprised that after his championship-winning 1980 season, Peter Collins of Lotus rang Pee Wee to ask for negotiations for a Lotus contract.
"I was so surprised that I just laughed," admits Pee Wee, *"I didn't even tell Roberto for a while."* At Zandvoort, Piquet and Moreno practised for a Grand Prix together for the fist time, and even though Moreno didn't qualify, Pee Wee wasn't disappointed: *"I still believe that Roberto will be good, I think he's the same class as Nelson and I think he will be as good."* The Milk Brother has taken one driver from F3 to the world championship; there's no reason why he shouldn't help another.

ORCHIDS AND CHEESE

The official 'party' for the Dutch Grand Prix took place on Thursday night an "Club 26" which, despite its location in the narrow alleyways of one of Amsterdam's more exotic quarters, is one of the city's most select. Along with the ritual show, jackpot and bingo, what most interested GPI was the ceremony during which the man who made the best time in first practice, René Arnoux, was presented with a new hybrid orchid named in his honour. With very few drivers improving their times the following session, René was once again on pole and, for the third time in four years became the proud recipient of 100 kilos of Dutch cheese, to the great delight of Nelly, who said with a smile: *"Stange as it may seem, we'd been out of it for a long time."*

TORNADO AT SETTIMO MILANESE

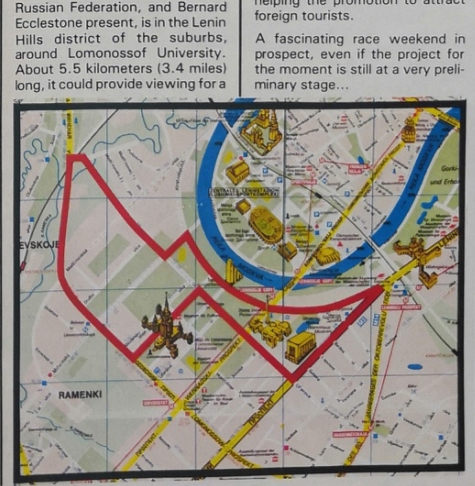
There was something miraculous about seeing the three Alfa Romeo 182's roll out of the Autodelta transporter at Zandvoort last Wednesday afternoon. On the night of June 19th, at about three in the afternoon, a huge storm had hit Milan:
"It lasted about a minute-and-a-half and it seemed like an eternity," said Gérard Ducarouge. *"There was a sudden cataclysm: the sky just went black and hail the size of tennis-balls* (Gérard likes to gild the lily, and perhaps he means the size of ping-pong balls) *fell on the city, accompanied by this incredible wind. Every window in the factory exploded and one of the walls of the engine assembly plant fell in, destroying Bruno's GTV. Luckily, the cars we were readying for Zandvoort were all in the new part of the workshop, which withstood the tornado. They were littered with bits of glass and filled with water to the brim but they were not fundamentally damaged. Everything else, however, was wrecked; it will take weeks and weeks to rebuild. No one can find his personal belongings, the tools were strewn all over the place and the electricity supply was totally ripped out. Luckily this scourge did not fall on us during the week when our workers were present; the consequences in human terms would have been even more disastrous."*
Besides giving Gérard and his colleagues one hell of a turn and sending them scurrying under the nearest and most solid desks (*"We ran about like a bunch of frightened rats"*) the tornado killed three and injured more than forty in the city, besides ripping up century-old trees planted there for all eternity.

MOSCOW G.P. IN 1983?

The most extraordinary story going round the paddock at Zandvoort was about the possible organization of a Grand Prix in Moscow in summer, 1983. The first contacts were made last year, through Agencia Quatro in Rome and the Company for Trade Development between the Soviet Union and the West, with the President of the Russian Automobile Federation (and a FISA vice-president), Leonid Afanasiev.
Moscow has a variety of possible circuits on streets with excellent surfaces and 15 to 20 meters (45 to 60 feet) wide, allowing chicanes to be installed. The layout selected at the last meeting, the Monday before Zandvoort, with Mr. Zelatev, vice-president of the Russian Federation, and Bernard Ecclestone present, is in the Lenin Hills district of the suburbs, around Lomonossof University. About 5.5 kilometers (3.4 miles) long, it could provide viewing for a quarter of a million spectators. Like Montreal, the proposed track is served by the Moscow Metro underground railway system.

The Soviet Union organizes 1,000 auto sports events each year including singleseater races resembling Formula Ford events, and there is a permanent circuit at Leningrad. A letter has already been adressed by the interested parties, including potential Western sponsors, to Mr. Antropov, an aide to President Leonid Brezhnev, and Mr. Antonov will meet the promoters at the end of July. A date around that of the Austrian GP of 1983 is being proposed, Zeltweg to Moscow being only about 36 hours for the transporters and motor homes. Television coverage would be by 30 cameras and the Soviet travel agency Intourist is said to be interested in helping the promotion to attract foreign tourists.

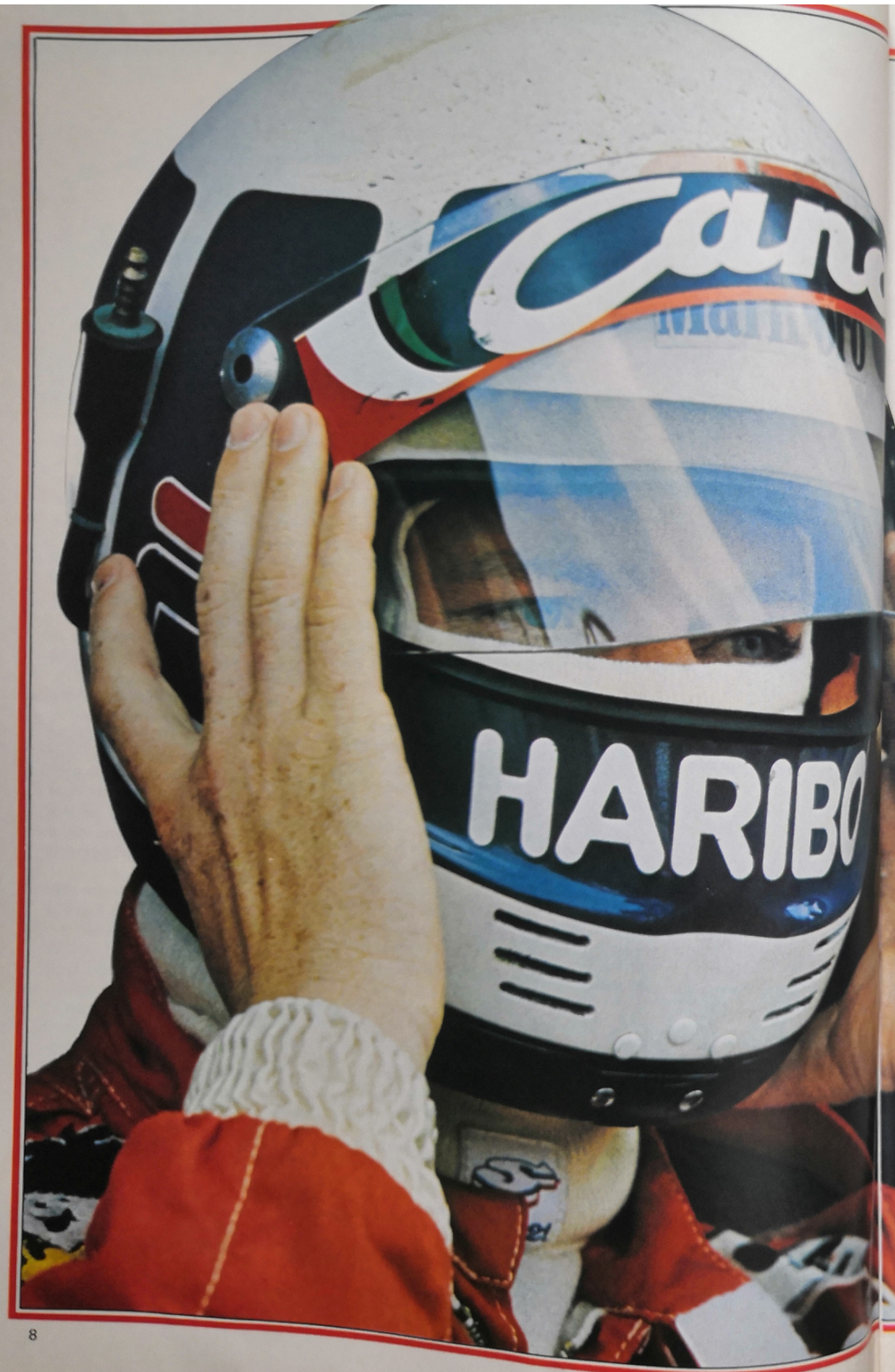
A fascinating race weekend in prospect, even if the project for the moment is still at a very preliminary stage...



AN EXCEPTIONAL WEEKEND

With a brilliant, faultless demonstration by car and driver, Didier Pironi last Saturday won a Dutch Grand Prix held in quite exceptional conditions.
It was exceptional because the date of July 3, breaking the tradition of the last week of August, was obtained only thanks to the successive withdrawals of Argentina, replaced by the Swiss race (at Dijon in France) and Spain; Zandvoort had only been second reserve on the FISA calendar.
Organized in only six weeks, because the final decision was taken during Monaco week, the Dutch GP ran without any major problems, other than a somewhat smaller crowd than usual.
It was also exceptional because, for the first time since the start of the season, a complete Grand Prix weekend went by in a relaxed atmosphere, in sharp contrast to the trials our sport has endured: the strike at Kyalami, the boycott at Imola, the tragedies of Zolder and Montreal, the panic in Detroit, the technical arguments in Monaco and the series of disqualifications in Rio, Long Beach, Imola and Zolder. For these three days, they were just bad memories. In the sea-tangy air of the Zandvoort dunes there was a calm confidence, a almost universal confidence in the future that was staggeringly unaccustomed.
It was exceptional, furthermore, because this confidence and good humour seemed to have a solid basis: Jean-Marie Balestre proved during the weekend that he is henceforth working hand in hand with most of the parties to Formula One racing. The latest FISA technical proposals, which the constructors are reported to be close to accepting, show a lucidity, a wish for balance and a positive attitude which have long been lacking. And it was exceptional because of the first news of the possibility of organizing a championship Moscow Grand Prix in 1983 — an absolutely serious project for a street race there next summer. It seems that the growth of Formula One, threatened at one stage, is taking off again expotentially; because if one day soon we may be in Moscow, we may also be racing in Australia, New York, Saudi Arabia and again in Japan, showing the true meaning of our sport's *World* Championship.

G.P.I.



PIRONI AND FERRARI TRIUMPH TOGETHER

29 points for Pironi, 18 for Prost, 4 for Arnoux, 3 for Jarier, 1 for Laffite, will that help the Ferrari driver to be the first french pretender to the world championship throne? His new teams-mate, Patrick, will surely be a plus.

When Didier Pironi's Ferrari took the lead from the fifth of 72 laps and pulled away irresistably for a long and unchallenged run to the flag, it seemed that man and machine, in complete symbiosis, were re-creating in front of our eyes the legendary triumphs of Lotus and Jim Clark, Tyrrell and Jackie Stewart.

by Didier Braillon

The comparison between the Golden Ages and modern racing stops there, however, because the rapidly widening gulf between the turbocharged cars and those faithful to atmospheric units is largely wiping out the chances of the drivers in the latter teams. The fast circuits are coming, and it promises to be a hard summer for Williams, McLaren and Alfa Romeo, as it was in the first few laps in Holland. Fifth time past the pits, after Pironi had slipstreamed past Alain Prost's Renault, five of the seven turbocars were leading the race: behind Didier and Alain come Rene Arnoux's Renault, Piquet's Brabham-BMW, and Patrick Tambay right up there in his first race in the Ferrari turbo. Riccardo Patrese in the second Brabham-BMW and the surprising Toleman-Hart of Derek Warwick were to quickly move into eighth and ninth places, sandwiching the best of the Cosworth runners, Rosberg and Lauda.

Then Renault started losing touch, before yet another debacle: Arnoux crashed with great violence at the Tarzan hairpin because of a major mechanical failure, and by one of the miracles that dot motor racing, escaped not only with his life but with only the most minor injuries; and Prost's engine failed because of an oil leak. From that moment, Pironi had the race won and the unconstestable supremacy of his Ferrari enabled him to choose his pace while making it clear to anyone thinking of chasing him that he had something in reserve. Just like Clark and Stewart used to do.

This victory was Pironi's second this

season, Ferrari's 83rd in the World Championship and seventh in the 31 Dutch GPs. Pironi was both satisfied and calm:

«Everything worked almost as well as I hoped. The car was perfect, both the engine and the chassis. I only had a small problem with the front right tyre towards the end of the race. It really wasn't major. But it could have become a big problem if I had been directly threatened by someone at that moment because I couldn't have spared my tyres».

The grand between Pironi and Nelson Piquet, which was 25''511 secs at 3/4 distance, dropped to 21'' 49 secs when they crossed the line. It was not serious, as Pironi said, particularly as the Brazilian was having to work hard to ensure that he kept the Williams at a respectable distance in the closing laps. Imola was 187.6 miles, Zandvoort 190 miles at an almost identical average speed. Was Didier worried about running out of fuel, as Gilles Villeneuve had been in San Marino ? *« Yes, we did in fact know that we risked being on the very limit with fuel, and the fact of being alone in the lead enabled me to avoid using full power. No one knows what would have happened if I had had to flight right to the end».*

Beaming, Didier Pironi heard the Marseillaise on the rostrum before gleefully joining Nelson Piquet and Keke Rosberg in the traditional champagne shower, then going to the press tent and talking on Dutch television. It was easier to go through the interviews knowing the win had put him just one point behind John Watson in the World Championship. Didier and John are back-to-back now, each with two wins, but Pironi has a new ally on whom he is counting a lot in his quest to become the first Frenchman to win the title: Patrick Tambay. His result this weekend, on paper, did not reflect the excellent impression he made:

« Patrick and I were together behind the two Renaults at the end of the first lap, and we weren't pushing to pass, because we knew that the Michelin tyres would have problems going the distance and that, sooner or later, we would be better than Prost and Arnoux. Later, Patrick drove very brilliantly until he started dropping back towards the end of the race, solely because of mechanical problems. I'm convinced more than ever that he will be a valuable and effective ally for me in the coming races. Here, his motor was not up to its normal power and I realised it when I caught him on lap 46: he was diabolically slow on the straight».

Didier had used practice to compare two different cars: one with a new chassis of different construction, with new front and rear suspensions and the classic transversal gearbox, the other with the normal chassis using the new longitudinal box which required a new rear suspension, and also with a new front suspension. The second car seemed better, but it did not have many miles and after highly detailed comparisons during the two dayx, Pironi decided to use the new monocoque with the classic gearbox for the race:

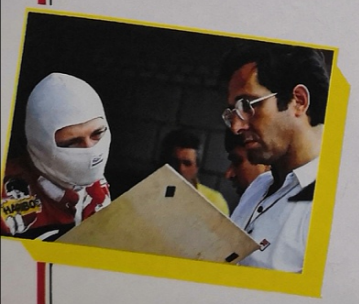
«I wanted to race the 126C2/060 because we have had a few little problems with the differential and with reliability with the new longitudinal box. It would have been stupid to take excessive risks because at the moment there's only a marginal difference in performance between the two versions. In two weeks at Brands Hatch, however, the new box may be a major advantage and could mean a car which is much more efficient than the traditional model. The smaller gearbox housing means better aerodynamics and greater ground effect, which shows up both in roadholding and in straight-line speed».

Pironi left Zandvoort with quite a record in his briefcase: fastest in first untimed practice, fourth in first qualifying, third in the second untimed, second in final qualifying and fourth in the warm-up; second in final qualifying and fourth in the warm-up; in the lead of the race after only a few minutes and then a classic solo to the flag.

It was reasonable to believe that Ferrari and its driver were now the best placed team for the championship:

«I am pretty optimistic,» Pironi admitted, *« because the Zandvoort weekend confirmed what I have thought for some time about the Ferrari: it is very reliable and very competitive, and we have proved that from now on we can fight for the title.*

« The only thing that saddens me is that Gilles is no longer here to profit from what we have developed in weeks and weeks of ceaseless work. »



Didier the lonesome Zandvoort victor, had a brilliant and intelligent race. His drive in Holland reminded us some of the legendary triumphs by Jim Clark or Jackie Stewart, like them, his style was so smooth and cool, he never gave the impression to drive fast, he cruised the imperial way. The main difference with history was : the use of the Turbo, surprisingly tamed in the hands of Didier.

EXTRA, EXTRA

MORENO: I NEED MORE MILES

IT was a tall order to ask Roberto Moreno to qualify his Lotus 91 for the Dutch Grand Prix. The little 23 year old Brazilian had only had 20 minutes in a Formula 1 car this year prior to Zandvoort practice, and that was in an 87. His last minute replacement of the still unfit Nigel Mansell hadn't allowed Roberto any time in the car, and the bumpy nature of the circuit battered his confidence to go quickly.

But 'Bash' (his nickname meaning Shorty) wasn't disappointed, nor was he a disappointment to his team. *"I just ended up doing my best,"* admitted Roberto as he tucked into an ice cream in the Lotus motorhome, *"but the bumps stopped me from going fast. You have to be confident to hold the car when it jumps on the bumps. The long downhill right-hander at the far side of the circuit has two bumps in it and there I just had to lift off.. Elio was getting 11,000 revs in fourth out of that corner down to the chicane, I was only getting 9,500 revs. And it's an important corner for your time. I don't think I would have qualified even if the track had been quicker on the second day."*

Perhaps too much was expected of Roberto before practice. He's the hottest property in the British Formula 3 championship after two wins in the last two races, and at the end of last year, he beat both Alan Jones and his friend Nelson Piquet in Formula Atlantic races in Australia. But apart from three brief test sessions with Lotus, the Atlantic Ralt was the fastest car he's ever driven. He was still a Formula Ford driver when his 'mentor' Greg Siddle negotiated his contract with Lotus in February of 1981.

But Moreno is determined to follow in Piquet's footsteps. Bash was the kid down the road in Brazil when Nelson was preparing his early racing cars in Brazil, and Moreno bought his first kart at the age of 14 from the current World Champion. And following in the footsteps of Nelson could become almost too litteral: he wears Nelson's old driving shoes after they are re-soled in South London.

It had been hoped that Moreno would get more miles in the JPS Lotus at Brands Hatch during the pre-British Grand Prix test day. *"The team had so many things to test which only allowed me half a day's testing, and my half day was wet,"* said Roberto. *"And remember, even if other drivers qualify for their first Grands Prix, they've usually done a lot of testing beforehand."*

So there was only one Lotus on the grid, but neither the team nor Siddle were unhappy. *"I still believe that he's in the same class as Nelson,"* said Siddle who masterminded Piquet's championship-winning F3 season in 1978. *"I'm sure he'll win Grands Prix in the future."*

Bob Constanduros

TAMBAY: A CONVINCING COME-BACK

IN setting sixth time in the first untimed session and sixth again in the first qualifying hour Thursday, Patrick Tambay quickly answered all the questions some people asked after he was chosen by Scuderia Ferrari to replace Gilles Villeneuve.

Didier Pironi had the job of comparing the new chassis 060 with 059 set up with the transverse gearbox, while Patrick only used 057. The difference of 329/1 000ths of a second between him and Pironi was partially explained by mechanical problems.

"Since this morning, the engine cuts out intermittently each lap and that handicapped me when I used my two sets of qualifiers. We haven't been able to find out what's causing it," he said.

Mauro Forghieri and Antonio Tomaini were nonetheless delighted with their new recruit, who turned up at the circuit the next morning after having conscientiously had a neck massage, because he had felt some strain going through the long curve leading onto the pit straight.

His Ferrari had a new motor, but to no effect: he was only 18th in the second untimed session, because of new troubles affecting the motor, this time not the waste-gate on the turbo but the ignition or injection.

They found the problem during the lunch break and Patrick was confident of moving a little nearer the front row of the grid. Unfortunately, a much hotter track and no following wind in the straight meant that, with two exceptions further down, the grid was unchanged from Thursday.

"The track was at least a second slower than Thursday. My engine problems were solved, but like the other drivers I used my two sets of tyres without getting any better."

Patrick had got stuck in, setting the third fastest time behind René Arnoux and Didier Pironi, but he still had doubts.

"Right at the end, when I had already used my tyres, I asked if they could put on a little more wing because there was still a fraction of oversteer. The result was positive, despite a little porpoising at the end of the straight."

Next day, a little of the extra downforce was taken off during the warm-up, for safety, and from the start, Tambay got himself in fourth place behind the turbos of Prost, Arnoux and Pironi. Piquet's Brabham-BMW, shadowing him, got past a lap later. But then Tambay used all his considerable experience to hold off an aggressive group composed of Lauda, Giacomelli, Rosberg and Patrese who attacked with vigor — particularly the Williams' driver. After passing the others he stuck on Tambay's tailpipes, making spectacular passing attempts from the slipstream to right and left each time they went into Tarzan. Tambay was not worried: *"I had been afraid of being gradually worn down physically, but then I got the feeling I could hold my position until the end."*

Rosberg, however, finally got through an lap 11. *"My engine started losing power in acceleration, with more or less the same affects that we had in practice, and Keke took me under acceleration going out of the chicane."* Fifth, then fourth when Arnoux crashed, Patrick managed to hold off Niki Lauda despite increasingly obvious engine problems.

"I managed to stay in charge for 28 laps, then suddenly everything went from bad to worse. He got past me easily, Daly went through two laps later and the end of the race was hardly brilliant with Alboreto and Baldi passing me as well.

As well as the engine trouble I had a few tyre problems. We chose the B compound and it was a bit risky. My right rear went off and I had to cope with increasing oversteer."

Tired and a little disappointed, Patrick almost excused himself: *"The Commendotore told me that bringing home a single point would be amply sufficient, but unhappily I couldn't do it."*

But Tambay had a superb weekend and he proved amply that he was worthy of the confidence of all the members of the Scuderia, and of his teammate, the easy winner on the day.

Didier Braillon

PRACTICE

The Canadian GP, the eighth event of the 1982 Championship, ended the first half-season, so the list of cars that had to prequalify during the first untimed practice at Zandvoort had changed: from now on it comprises those constructors who have not scored a point in the first half-season, instead of those who did not score last year. As 13 constructors

appeared on the Championship lists on the eve of the Dutch race, there were four who had to prequalify, March, Toleman, Theodore and Ensign. That meant Mass, Boesel, de Villota, Warwick, Fabi, Lammers and Guerrero, with one dropping out after the 90 minute session. Unlike the others, they had to use two sets of tyres duly marked and then checked by stewards at the exit of the pit lane. This race in a race caused little surprise because, as usual, it was the semi-official March of Emilio de Villota which was slowest of the group, well behind the others and 31st of the 32 times recorded.

When the track was opened Thursday morning, the sky was clear and a strong wind swept the circuit, blowing a bit of sand here and there on the corners. The few spectators really only wanted to watch Lammers, but it was Pironi was set the fastest time. After clocking 1'16"681 in the Ferrari with the fore-and-aft gearbox, he changed to the chassis with the usual transverse box to do 1'15"883, ahead of Piquet, Lauda, Prost, de Cesaris, Tambay, Patrese, Watson, Giacomelli and Arnoux. It was no easy session for Piquet, despite his second fastest time, because after 10 minutes an oil leak started a small fire on his race car, forcing him to change to the spare.

The session seemed extraordinarily calm, serious business starting in the early afternoon with the first one-hour qualifying session which Frank Williams watched on the side of the track at the Hunserug, watching the handling of his cars and others with his hawk eyes.

From the first few minutes it was clear to everyone that René Arnoux's 1981 pole time of 1'18"17 and indeed his 1980 time of 1'17"44 were completely eclipsed by the frightening cornering speed of the current cars – very evident in tight corners such as Tarzan and Hunserug. And the Renaults took the front row, Arnoux on pole with an extraordinary 1'14"233 at 128.13 mph, heading Prost by 0.427 seconds. Almost four seconds faster than last year...

Behind the uncatchable Renaults, Piquet was third despite a spin and a off into the sand at Tarzan on one fast lap. He had just gone through the Hunserug in a perfect powerslide, reminding the onlookers that modern F1 cars *can* slide spectacularly. The session was stopped briefly and they also brought in Alboreto's Tyrrell which had stopped on the track. Behind Piquet, Pironi at the wheel of the older Ferrari completed the quartet of turbos ahead of Lauda's McLaren, Tambay in the second Ferrari in great form despite annoying engine problems, and Rosberg in the Williams. The Alfa Romeos of Gia-

comelli and de Cesaris were grouped eight and ninth, handicapped by a lack of straight line speed. While Arnoux was radared at 192 mph at the end of the straight, the Italian cars were only doing about 174 mph, compared with Lauda's 180 mph in the fastest of the atmospheric engined cars. By comparison, in the other turbos Piquet and Tambay touched 190, Pironi 189, Patrese 187 and Prost 186 mph.

Behind the Alfas in this first session came Patrese, Watson and Daly, ahead of the surprisingly fast Toleman driven by Derek Warwick, who set 13th time. *"We haven't changed anything on the car since Monaco,"* claimed a smiling Warwick, *"and I just went as fast as I could."* Toleman had, however, missed the two North American races and had tested intensively.

Not everyone could go as fast as they thought they should. Winkelhock had a 'cobbled-up' chassis on the ATS and Laffite had erratic roadholding. The Talbot-Ligier JS19s had no grip (Cheever simply said *"no downforce"*) because of a persistent skirt problem. They tend to bend outwards and lose their airtightness. Cheever even tried the old JS17 in an attempt to qualify in case it rained on Friday. He ran out of fuel, and sprinted back to the pits to put his second set of tyres on the JS19. But the mechanics were working on its gearbox and skirts and it took precious time, Eddie ending a provi-

sional non-qualifier with Guerrero's Ensign, Fabi's Toleman whose motor blew after four laps, and Moreno's Lotus. Sitting in for the injured Mansell, Moreno was seven seconds off Arnoux's pace. The final minutes of the session were lost when a rain squall blew in from the North Sea. Most drivers recognized, however, that the relatively cool, humid air and a very strong wind behind them down the straight had helped considerably in setting good times.

On Friday morning, the much-feared rain and the helpful wind were gone. There was an immaculately blue sky and the little resort of Zandvoort was enjoying Riviera-type heat. The morning session saw de Angelis set fastest time with the Lotus T-car. *"It's got much better roadholding than the car I used yesterday,"* he said, *"because that was porpoising too much. This T-car is the one we used for the tyre testing two weeks ago here and which went so well."* Moreno was far from pleased. He found his car bouncing diabolically in the fast corners and when he asked to use the second T-car, he only got in one lap before the chequered flag went out.

Williams also had roadholding problems – *"no grip"* said Daly, *"understeer,"* growled Rosberg – while there was a little more joy at Talbot-Ligier where Laffite and Cheever had set 10th and 12th times. But unlike most of the field, they were not running their race set-up and tankage. Renault was working without worrying about times. Arnoux was 20th and Prost 26th, but the RE30Bs were brim full of fuel with race rubber, looking for the best suspension compromise for the race. Behind de Angelis was de Cesaris in his T-car, Pironi in the car with the new gearbox, Piquet in the T-car after his race car had another minor fire, Alboreto, an unusually quick Baldi on much improved Pirellis, and Giacomelli.

The unlucky were Patrese, who only did six laps because of an injection or electronic ignition problem, Jarier who had strong vibrations and whose car broke down on the circuit after a minor fire, Guerrero who stopped after two laps with violent porpoising, and to a degree Tambay, whose new engine did not work perfectly.

It was very hot for the final qualifying hour and it very quickly became apparent there was no chance of improving the best times of the previous day, especially as the following wind had dropped. Only four drivers made improvements, Laffite getting down to 1'18"478, Surer to 1'18"296, and Fabi and Cheever who were desperately trying to qualify, Cheever even using Laffite's car for his second set of tyres, but to no avail. They joined Moreno, who also tried two cars, and Guerrero, who lost second gear, as the non-qualifiers.

Arnoux had the fastest time again, but at 1'15"791 it was more than one and a half seconds slower than Thursday's pole. He headed Pironi, who tried one set on each of his cars, Tambay whose engine trouble seemed to have been cured, Prost who tried the T-car after feeling his race engine that morning was not the best, and Patrese.

At Alfa Romeo, de Cesaris first went out on unmarked rain tyres to check the handling before using qualifies, a trick which would certainly have caused trouble had the track not been obviously slow.

And Rosberg and Piquet were not credited with any times! Frank Williams and Bernard Ecclestone informed the stewards at the start of the session that as there was no chance of improving their times, they would send their men out on unmarked race tyres with full tanks to get an extra hour of race preparation. Tactics...

Didier Braillon

THE RACE

Didier Pironi put on the most impressive display of turbo superiority at Zandvoort to score a run-away win. Montreal victor Nelson Piquet gave the Brabham-BMW another impressive showing with second place — albeit by a very narrow margin over Keke Rosberg's Williams. He was the first of the non-turbos over the line in this turbo-dominated weekend which again saw no smiles on Renault faces.

Everyone was predicting an easy turbo win around a fast circuit like Zandvoort and Didier Pironi lived up to those predictions.

He let the reins off his prancing horse on lap 5 of the 72 lap race and galloped ahead of his opposition to win by a comfortable 21 seconds after holding a 30-second lead over his closest rival for most of the race.

He had plenty of fuel this time and his commanding lead allowed him to nurse a blistered front right tyre which might have been a major worry had he been under any real pressure.

That could have come from the pole-winning Renaults of Rene Arnoux and Alain Prost, but once again the two yellow Renaults never made it to the finish.

After leading briefly at the start, Prost could not stay with the Ferrari, while a vibration from the steering saw Arnoux slip back to fourth place behind Nelson Piquet's Brabham-BMW. The vibration, which Arnoux had thought was a tyre that had turned on the rim, was far more serious.

The steering arm broke under braking for Tarzan at the start of the 22nd lap, and the front left wheel snapped back and parted company with the chassis. At well over 100mph, the helpless Arnoux went straight off the track and ploughed head on into the barrier which, fortunately, had plenty of tyres piled in front of it. The car rode up on the tyres and ended up perched atop the barrier, the front of the chassis badly bowed under impact and trapping Rene's legs, but nevertheless protecting him from any injury other than a few bruises.

Renault's second blow came just ten laps later when Prost parked the other car with a sick and smoking engine just after Piquet had snatched second place for BMW.

From then on, Piquet was unable to make any impression on the Ferrari, the Brazilian more concerned with his second place. Although he had no car filling his mirrors, his pit board showed Keke Rosberg's Williams slowly gaining ground.

Rosberg, baulked at the start and finishing the first lap in tenth place, was soon making short work of the two Alfa Romeos and the two McLarens ahead of him. After 12 laps of racing he had moved up to fourth place ahead of Tambay in the second Ferrari. Tambay had made a good start, but his engine was not as strong as it should have been because of a fuel injection problem and he was unable to hold off the agressive Williams driver for long. Rosberg was running quickest of the non-turbo cars, but at a price. *"My front left tyre blistered and the car began to understeer, so I had slow up a little and try and save the tyre. From then on I had to concentrate really hard not to get the car out of shape at all and put more strain on the tyre than was necessary,"* said Keke...

For the next 25 laps he drove a lonely race, but by half distance when he began to get the gap to Piquet he started to run harder again, his front tyre getting no worse than it had been at the start.

1. The Renaults of Prost and Arnoux got away fastest but Pironi's Ferrari was already in their slipstreams. (Photo: B. Asset).

2. Clutch problems on his JS19 meant Laffite had to race the old JS17. Trailing the pack, he retired on lap 4 of because of lack of roadholding. (Photo: B. Asset).

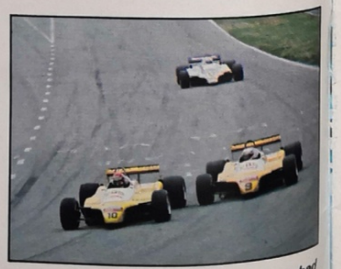
3. Prost, Pironi and Arnoux have already drawn out a gap on lap 2, while Tambay holds up a determined poursuit. (Photo: B. Asset).

4. Piquet was the first to get past, at the start of lap 3, to lie fourth ahead of the Ferrari. It was still blocking Lauda, Giacomelli, Watson, de Cesaris and Rosberg. (Photo: B. Asset).

5. Tambay was hanging on at the end of lap 3, with the four leaders in creasing the gap. Behind Lauda and Giacomelli, Rosberg was starting his great charge. (Photo: B. Asset).

6. It was the fifth time through Tarzan that Pironi took charge. Once past Prost, his Ferrari took off at amazing speed to start his solo to the flag. (Photo: B. Asset).

7. Warwick's Toleman got up to ninth place at the end of lap 8 when his rear wing came off on the straight. After a pit stop, Warwick surprisingly set fastest race lap before being halted by an oil leak. (Photo: First Line).



8. From lap 11 to lap 20 the ATS team had their own private scrap. Salazar and Winkelhock passed and repassed each other, often rubbing tyres. (Photo: B. Asset).

9. Rosberg repeatedly tried to get past Tambay with spectacular attacks going into Tarzan. He finally succeeded on lap 12 when Tambay's engine faltered coming out of the back chicane.

10. Arnoux was third behind Pironi and Prost on lap 21 when he crashed violently into the tyre barrier at Tarzan after a front wheel came off. Amazingly, he escaped virtually unscathed. (Photo: B. Asset).

11. Watson, the championship leader, and de Angelis had a great scrap from lap 14 to 27, although they were only 9th and 10th. (Photo: B. Asset).

12. Daly found the way past Giacomelli on lap 36. The Italian was slowed by broken exhaust pipes, and Daly got into the points. (Photo: B. Asset).

13. Increasingly handicapped by his engine problem, Tambay lost a 26-lap battle with Lauda, who passed him on lap 38. The Ferrari was then fifth, but gradually slipped down the chart.

14. Baldi had an excellent race in the Arrows and was only lapped by Pironi on lap 42. He passed Tambay 13 laps from the flag, getting his point finally after the Alboreto-Daly incident.

15. Two laps from the end, the Tyrrell and the Williams tangled at Tarzan, fighting for fifth place. Daly got away first, Alboreto had a bent rear suspension and puncture that cost him sixth, and he let Daly know it after the race. (Photo: B. Asset).

16. Pironi listens to the Marseillaise and Piquet thinks that 15 points in two races has suddenly made him a credible title defender. (Photo: B. Asset).

"With ten laps to go and a chance of catching Piquet I gave it all I could. I knew he would be able to turn up the turbo and hold me back but my only hope was that it would cause his engine to break or better still run short of fuel," explained Rosberg.

He got the gap down to four seconds as Piquet got held up by slower traffic, but there was nothing he could do in the closing laps, Piquet crossing the line less than a second ahead of the Williams with 4 gallons of fuel left.

Behind Rosberg, only Lauda had managed to avoid being lapped by Pironi at the chequered flag, while the battle for fifth place was an even more dramatic one involving the second Williams of Derek Daly and the Tyrrell of Michele Alboreto.

Daly, like Rosberg, had problems with his car's left front tyre, which was in a far worse condition towards the end of the race. Alboreto had driven a hard race from 15th place in the opening laps and was catching Daly fast. With two laps to go the two drivers braked almost side by side for Tarzan, Daly taking the inside line and braking *"as late as I could and a bit too late."* Alboreto did the same thing, both cars sliding wide in the corner, Alboreto's getting oversteer on the slippery outside edge. *"He came around into me and my front left hit his rear right,"* said Daly, both cars spinning off the track, although it was Daly who snatched a gear first and was first to get going again. Alboreto lost his place to the Arrows of Mauro Baldi, but desite a badly bent rear suspension causing smoke to pour from the Tyrrell's rear tyre, Alboreto stormed back into the race and crossed the line just a few lengths behind the Arrows in which Baldi got the first point of his F1 career.

A furious Alboreto shouting *"Bastardo"* at Daly tried to fight with him after the race and had to be held back by various members of the two teams.

Behind the angry Alboreto it was Tambay who took eighth place after a fine debut for Ferrari and a result which would most certainly have been much better were it not for his engine problems. Watson came next, his race spoiled by some poor tyres at the start of the race. *"The car was handling terribly. I stopped for fresh tyres, exactly the same compound, and it went much better for the rest of the race,"* said Watson. Equally unlucky was Surer in the second Arrows. He also stopped for tyres because of excessive oversteer and rejoined the race with Daly, racing the Williams for the rest of the G.P. and running strongly to the finish, but a lap down.

Amongst the non-finishers, Derek Warwick made an impressive start before his Toleman lost its rear wing and then all its oil. However the Hart engine gave signs of things to come with Warwick taking an impressive fastest lap two laps before retiring on lap 15.

Both Marches went out with broken valve springs. Local boy Jan Lammers lost his engine while Henton's Tyrrell stopped with a broken throttle linkage. □

Zandvoort statistics

DUTCH GRAND PRIX

Date : July 3, 1982
Circuit : Zandvoort
Circuit length : 2.642 miles
Race distance : 72 laps, 190.229 miles
Weather : overcast, some drizzle
Attendance : 45,000

PREVIOUS WINNERS

(Last five races)

1977 :	LAUDA (Ferrari)
1978 :	ANDRETTI (Lotus)
1979 :	JONES (Williams)
1980 :	PIQUET (Brabham)
1981 :	PROST (Renault)

STARTING GRID

PROST	Renault RE30B	**ARNOUX**	Renault RE30B
	1'14"660		1'14"233
PIRONI	Ferrari 126C2	**PIQUET**	Brabham BT50 BMW
	1'15"825		1'14"723
TAMBAY	Ferrari 126C2	**LAUDA**	McLaren MP4 1B
	1'16"154		1'15"832
GIACOMELLI	Alfa Romeo 182	**ROSBERG**	Williams FW08
	1'16"513		1'16"260
PATRESE	Brabham BT50 BMW	**DE CESARIS**	Alfa Romeo 182
	1'16"630		1'16"576
DALY	Williams FW08	**WATSON**	McLaren MP4 1B
	1'16"832		1'16"700
ALBORETO	Tyrrell 011	**WARWICK**	Toleman TG181C
	1'17"237		1'17"094
BALDI	Arrows A4	**DE ANGELIS**	Lotus 91
	1'18"020		1'17"620
WINKELHOCK	ATS HGS1	**SURER**	Arrows A4
	1'18"352		1'18"296
HENTON	Tyrrell 011	**SERRA**	Fittipaldi F8D
	1'18"476		1'18"438
BOESEL	March 821	**LAFFITE**	Talbot-Ligier JS19
	1'18"658		1'18"478
MASS	March 821	**JARIER**	Osella FA1C
	1'19"083		1'18"953
LAMMERS	Theodore TY02	**SALAZAR**	ATS HGS1
	1'19"274		1'19"120

Did not qualify :
Guerrero (Ensign N181) 1'19"316
Fabi (Toleman TG181C) 1'19"414
Cheever (Talbot-Ligier JS19) 1'19"646
Moreno (Lotus 91) 1'21"149

Did not pre- qualify :
De Villota (March 821)

PROVISIONAL DRIVERS WORLD CHAMPIONSHIP STANDINGS

(After South Africa, Brazil, USA West, San Marino, Belgium, Monaco, Detroit, Canada and Dutch GPs)

1. WATSON	1	6	1		9		9	4		30
2. PIRONI		1		9		6	4		9	29
3. ROSBERG	2		6		6		3		4	21
4. PATRESE			4			9		6		19
5. PROST	9	9								18
6. PIQUET					2			9	6	17
7. LAUDA	3		9						3	15
8. ALBORETO		3	3	4						10
CHEEVER					4		6			10
DE ANGELIS			2		3	2		3		10
11. MANSELL		4				3				7
12. REUTEMANN	6									6
VILLENEUVE				6						6
14. DALY						1	2		2	5
DE CESARIS							4	1		5
16. ARNOUX	4									4
17. JARIER				3						3
18. WINKELHOCK		2								2
SALAZAR				2						2
SURER								2		2
21. BALDI									1	1
SERRA					1					1
LAFFITE							1			1

RESULT

1.	**PIRONI** (Ferrari 126C2), 72 laps, 190.22 miles, in 1h38'03"254, av. speed 116.38 mph		
2.	PIQUET	Brabham BT50 BMW	21"649 behind
3.	ROSBERG	Williams FW08	22"365 behind
4.	LAUDA	McLaren MP4 1B	1'23"720 behind
5.	DALY	Williams FW08	1 lap behind
6.	BALDI	Arrows A4	1 lap behind
7.	ALBORETO	Tyrrell 011	1 lap behind
8.	TAMBAY	Ferrari 126C2	1 lap behind
9.	WATSON	McLaren MP4 1B	1 lap behind
10.	SURER	Arrows A4	1 lap behind
11.	GIACOMELLI	Alfa Romeo 182	2 laps behind
12.	WINKELHOCK	ATS HGS1	2 laps behind
13.	SALAZAR	ATS HGS1	2 laps behind
14.	JARIER	Osella FA1C	3 laps behind
15.	PATRESE	Brabham BT50 BMW	3 laps behind

CONSTRUCTORS' WORLD CHAMPIONSHIP

1. McLaren 45pts 2. Brabham 36pts 3. Ferrari 35pts 4. Williams 32pts 5. Renault 22pts 6. Lotus 17pts 7. Talbot-Ligier 11pts 8. Tyrrell 10pts 9. Alfa Romeo 5pts 10. ATS 4pts 11. Osella, Arrows 3pts 13. Fittipaldi 1pt

OFFICIAL QUALIFYING TIMES

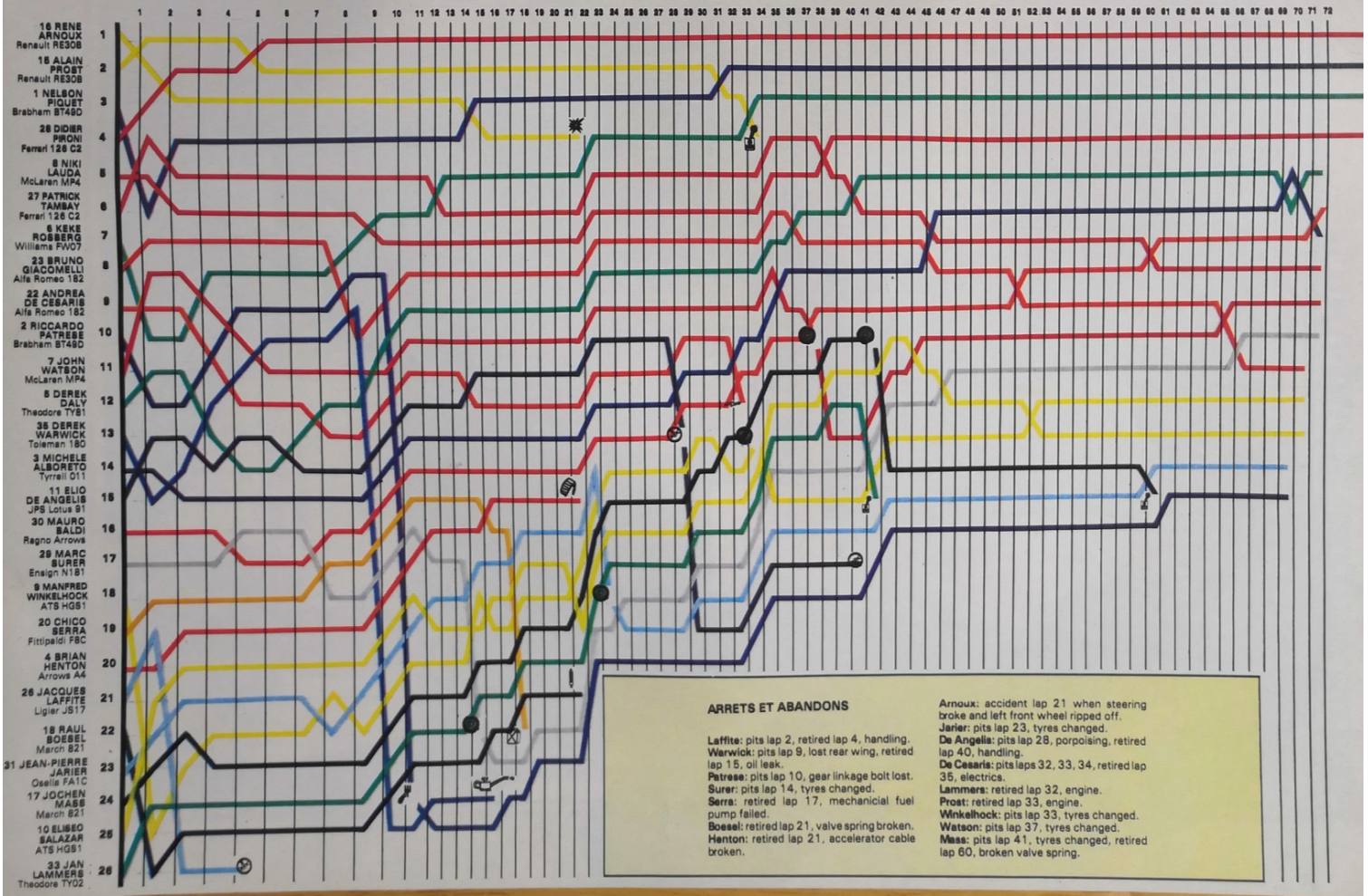
	Untimed practice 1	Timed practice 1	Untimed practice 2	Timed practice 2	Warm-up Saturday
ARNOUX	1'17"530	**1'14"233**	1'20"556	1'15"391	1'20"552
PROST	1'16"686	**1'14"660**	1'20"761	1'17"456	1'19"396
PIQUET	1'16"272	**1'14"723**	1'18"099		1'18"360
PIRONI	**1'15"883**	**1'15"825**	1'18"028	1'16"655	1'20"032
LAUDA	1'16"371	**1'15"832**	1'19"894	1'17"653	1'20"531
TAMBAY	1'17"285	**1'16"154**	1'20"360	1'17"004	1'22"199
ROSBERG	1'17"933	**1'16"260**	1'19"275		1'20"618
GIACOMELLI	1'17"456	**1'16"513**	1'18"905	1'18"051	1'20"630
DE CESARIS	1'17"149	**1'16"576**	1'17"938	1'17"638	1'21"408
PATRESE	1'17"364	**1'16"630**	1'21"863	1'17"502	1'20"475
WATSON	1'17"412	**1'16"700**	1'19"854	1'18"153	1'20"405
DALY	1'18"301	**1'16"832**	1'19"682	1'18"185	1'20"881
WARWICK	1'17"890	**1'17"094**	1'21"782	1'18"255	1'18"782
ALBORETO	1'17"800	**1'17"237**	1'18"596	1'18"362	1'21"858
DE ANGELIS	1'17"915	**1'17"620**	**1'17"327**	1'17"817	1'20"584
BALDI	1'18"574	**1'18"020**	1'18"896	1'19"128	1'22"657
SURER	1'21"206	1'19"015	1'19"322	**1'18"296**	**1'21"239**
WINKELHOCK	1'18"696	**1'18"352**	1'20"620	1'19"092	1'20"598
SERRA	1'19"131	**1'18"438**	1'19"202	1'19"479	1'22"221
HENTON	1'18"861	**1'18"476**	1'19"918	1'19"304	1'21"862
LAFFITE	1'18"245	**1'18"487**	1'19"291	**1'18"478**	8'13"500
BOESEL	1'18"039	**1'18"658**	1'20"577	1'19"687	1'22"820
JARIER	1'20"510	**1'18"953**	1'20"725	1'19"753	1'22"741
MASS	1'18"580	**1'19"083**	1'20"540	1'19"907	1'23"606
SALAZAR	1'20"139	**1'19"120**	1'20"732	1'20"169	1'21"624
LAMMERS	1'18"779	**1'19"274**	1'19"945	1'20"427	1'22"187
GUERRERO	1'20"422	**1'19"316**	5'53"396	1'20"361	
FABI	1'19"337	**1'20"425**	1'20"726	**1'19"414**	
CHEEVER	1'19"625	**1'19"728**	1'19"625	**1'19"646**	
MORENO	1'23"902	**1'21"149**	1'22"134	1'22"332	
DE VILLOTA	1'21"507				

NB : Piquet and Rosberg did not officially set times during the second qualifying session as their teams opted to use unmarked tyres. Piquet did 1'19"70 and Rosberg 1'17"54

THEIR FASTEST LAPS

WARWICK	1'19"7
PIQUET	1'19"8
ROSBERG	1'20"1
DALY	1'20"2
PIRONI	1'20"3
PROST	1'20"8
PATRESE	1'21"1
LAUDA	1'21"2
SURER	1'21"2
WATSON	1'21"2
ARNOUX	1'21"3
ALBORETO	1'21"4
WINKELHOCK	1'21"4
JARIER	1'21"7
TAMBAY	1'21"8
GIACOMELLI	1'21"9
MASS	1'21"9
BALDI	1'22"0
DE ANGELIS	1'22"0
DE CESARIS	1'22"6
HENTON	1'22"7
SALAZAR	1'23"2
SERRA	1'23"2
LAMMERS	1'23"5
BOESEL	1'23"6
LAFFITE	1'33"0

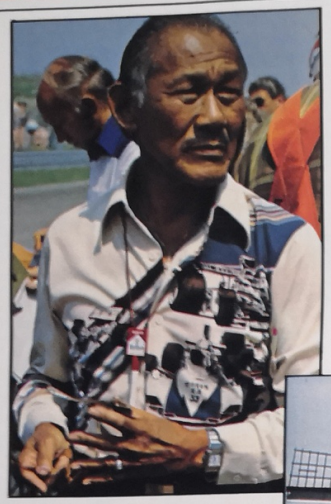
ronde - Lap by lap - Giro per giro - Runde um runde - Tour par tour - Vuelta a vuelt



ARRETS ET ABANDONS

Laffite: pits lap 2, retired lap 4, handling.
Warwick: pits lap 9, lost rear wing, retired lap 15, oil leak.
Patrese: pits lap 10, gear linkage bolt lost.
Surer: pits lap 14, tyres changed.
Serra: retired lap 17, mechanicial fuel pump failed.
Boesel: retired lap 21, valve spring broken.
Henton: retired lap 21, accelerator cable broken.
Arnoux: accident lap 21 when steering broke and left front wheel ripped off.
Jarier: pits lap 23, tyres changed.
De Angelis: pits lap 28, porpoising, retired lap 40, handling.
De Cesaris: pits laps 32, 33, 34, retired lap 35, electrics.
Lammers: retired lap 32, engine.
Prost: retired lap 33, engine.
Winkelhock: pits lap 33, tyres changed.
Watson: pits lap 37, tyres changed.
Mass: pits lap 41, tyres changed, retired lap 60, broken valve spring.

Postcard from Zandvoort



Didier's wife watches his times

F 1 Comes to town

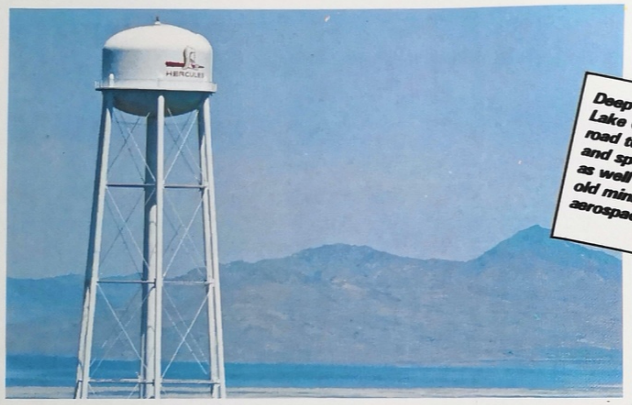
Teddy Yip in formal gear...

Amsterdam's not far

Dutch Don Quixote?

There's now an orchid called Arnoux

THE SPACE-AGE Mc LAREN



Deep in Utah, Salt Lake City is on the road to Bonneville and speed records, as well as being an old mining and new aerospace centre.

As the United Airlines 737 left 16,000 feet and nosed down through the great puffy white clouds, there below us lay the picturesque snowcapped peaks of the Rocky Mountains. Nestling in the foothills, almost like Lilliput itself from 2 miles above was Salt Lake City. Once a small gold-rush mining town, it is now a modern high rise city founded on the mineral wealth dug out of the mountains towering above it.

By Jeff Hutchinson

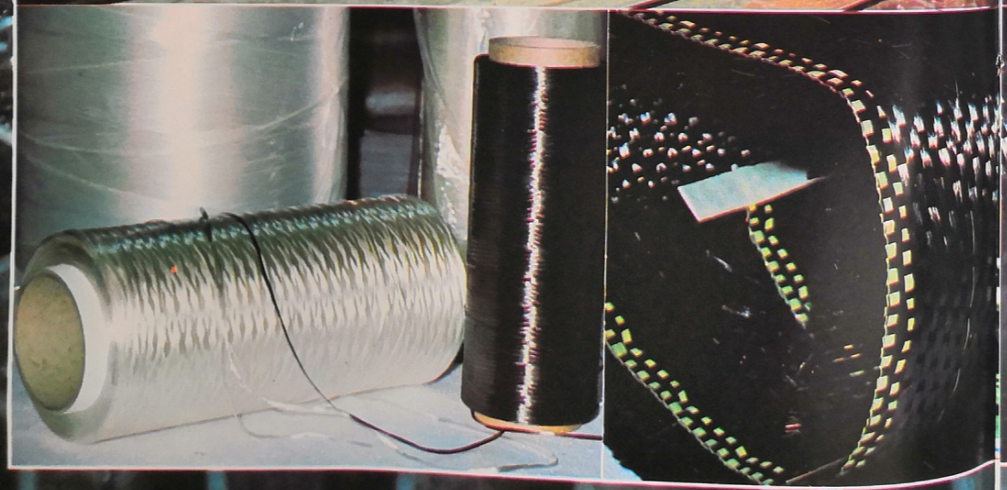
To your right you can see the famous Salt Lake, to the left of the aircraft the City itself", said our "Fly the friendly skies" Captain. Despite the *déjà vu* monotone to his voice, even he must have been impressed by the rare crystal-clear view spread out like a living map below us, the air having been washed clean by the heavy rains of a cold front that had passed through the area a few hours before our arrival.

As we turned downwind for a visual approach to the airport off our left wing, the green foothills of the Rockies gave way to the rich browns and reds of the desert, criss-crossed with the white salt deposits which mark the passage of the rains down from the hills to the great lake itself, which was surrounded with an ugly white tide mark outlining its winter limits.

In the distance, perhaps 60 miles away, but just as clear beyond another range of mine-scarred hills, lay the famous Bonneville Salt Flats, turning my thoughts to all those famous names that have triumphed and so often died in their quest for speed out on those

Hercules now builds the most sophisticated carbon fiber monocoques in the world, and they come out of this autoclave.

Hercules is a major aerospace and weapons company. This is the transport and launch cylinder for the new MX strategic missile.



It's no easy job building a McLaren MP4 chassis. The first stage is to work with carbon fiber in rolls or fabric.

barren wastes. But it wasn't land speed record breaking that had brought me to the middle of Utah.

My business here lay just a dozen miles or so from the airport, at a fortified looking complex over looking the city from its own perch on the foothills on the opposite side of the valley, some 20 miles from the city center. It had been built to be isolated, although by now, the sprawling suburbs of Salt Lake City are no more than a couple of miles away from that complex, which is now the source of complaints from some of those very residents who chose to live so close by.

A few minutes later, our ten tough tyres had chirped their greeting to the rubber stained runway and within an hour, feet now firmly back on the ground, I was standing at the main entrance to the now even more impressive looking complex. A huge panel marked, "Hercules — Aerospace Division," soon provided the answer to the high chain-link security fencing and all the "Keep Out" signs. A security guard relieved me of a box of matches and gave me a visitor's security pass noting with a suspicious ring to his voice that I was indeed a "Ferenah" as he glanced at the forms I had filled in. I was certainly a long way from any race tracks or racing cars and it was hard to believe as I was escourted down a long corridor past padlocked oil drum rubbish bins marked "Classified waste" that there could be any connection between the Marlboro-McLaren team and this highly secret, space technology orientated complex that surrounded me. There were Minute-Man and Polaris misiles and satelites on display in the main entrance; but alongside all these impressive looking objects sat a more familiar looking piece of equipement — the bare and slightly damaged monocoque of John Watson's McLaren MP4. The very same from which he had stepped unharmed after a terrifying 170 mph crash in last year's Italian Grand Prix.

It was some comfort to know that the admirals and generals of the world who had trodden this path before me were probably just as mystified by the sight of an F1 monocoque as I was by the hardware of their business which surrounded me.

"Waiting to meet me in the austere business like office was Bob Randolph manager of the composite structures division of Hercules, and one of the key figures in bringing this exotic and fascinating world of aerospace technology and Grand Prix racing together, each of them linked by one of the industries fastest growing technologies — carbon fiber.

The Hercules group is one of America's leading producers of carbon-graphite fiber materials, which comes most commonly in tape, thread or woven cloth form originating from petroleum bi-products, just like many of the man-made fibers which most of us wear every day. When used in the construction of aeroplanes, helicopters, rockets and, more recently things like tennis racquets, fishing rods, golf clubs, bicycles and, of course, racing cars, carbon fiber has two major advantages. It's stronger and lighter than its metal, wood, or glass fiber equivalents but it's expensive, around 30 dollars per lb compared to say 2 dollars per pound for something equivalent made in steel.

The weight and strength outweigh the cost considerations to most of the Grand Prix teams, and so when Ron Dennis and John Barnard of McLaren went "shopping" for someone to build their new MP4 monocoques, it wasn't the cost that made such a thing hard to get, but finding somebody with sufficient expertise in this relatively new field of construction who was both willing and able to take on the kind of job they had in mind. They found little joy in Europe, and so when Barnard's assistant designer, Steve Nichols, an ex-Hercules employee, suggested they try Hercules, Dennis was instantly trying to trace their telephone number through directory enquiries from his office 6000 miles away.

"I got a telephone call one Friday afternoon," recalls Randolph, "and on Monday morning Ron and John were in my office explaining what they wanted us to do for them," Randolph smiled at the recollection of that first meeting which, at the time, he would never have guessed would grow into such a deep rooted collaboration and mutual respect which the men of the two companies share to-day.

"We had been approached once before in the past by Dick Simon's Indy car team to build specific parts for one of their cars, but it didn't really fit in with what we were doing at the time. But when McLaren came to see us, Ron did a good job of selling us on the programme, no doubt seeing more into the future of such a partnership than even we could envisage at the time. He got us very interested in all the possibilities it represented for our company, although when we first agreed to do the job, it was more on a customer-client relationship, but since then, we feel almost like part of the team, our involvement has become one of active sponsorship rather than just suppliers," says Randolph.

One of the few pictures to decorate his office is one of the McLaren MP4 taken by one of the Hercules staff at last year's Las Vegas GP and it is a sign of the company's involvement to-day that several of their top executives sat through the cold and rain in the public stands at Detroit and Montreal watching "their" car win in Detroit and place third in Montreal. Even the cover of the annual report of this multi-million dollar company proudly shows a colour photograph of the McLaren monocoque under construction at their plant.

Inside, there are more pictures of the car, while a holiday planning chart on

the wall of one of the fabrication shops was marked, "gone racing" through a ten-day period for one of the names as he took his holiday around the recent two N. American GPs. "I hope to be coming over to England for the race at Brands Hatch," another member of the staff told me, reflecting the real racing "fever" which has taken over the men and women of the Salt Lake City complex.

The McLaren cars now have a Hercules sticker advertising their involvement. A small price to pay for each of their estimated $50,000 monocoques. But as Dennis forsaw and Hercules have increasingly begun to appreciate, this is not just a one-way love affair.

One of the problems which any aerospace company like Hercules has with marketing its products is being able to prove themselves in the field. "You can carry out laboratory tests and the like, but you can never reproduce actual conditions," says Randolph. Although a Grand Prix race might be a long way from sending a man into space or a helicopter into war, it is an ideal publicity vehicle and proving ground for their products and technology. Hence, the remains of John Watson's monocoque from Monza proudly displayed in the main lobby complete with a sequence of pictures of his accident showing their product in a "man rated" situation, to use the aerospace jargon of Bob Randolph.

"There is a high similarity between the problems of building space parts or perhaps the ejection capsule of a supersonic jet fighter and we have been able to learn a lot," he says.

To add weight to his argument, he illustrated his company's involvement with McLaren as one of the important reasons behind winning a recent contract to supply NASA with carbon fiber fuel cells for future space shuttle flights. Their "man rated" McLaren project was a nice "ace" card in their hand when bidding against their opposition for the contract. By using the carbon fiber wound rocket capsules, the shuttle will save 38 tons, thus increasing the pay load by the same amount. Carbon fiber floor beams on the new Boeing 757 will save more weight, while all new carbon fiber composite wings on the latest American built AV8B marine version of the British designed Harrier jump jet will be another big improvement.

A more earthly connection comes with the signing of a new contract with Ford to supply carbon fiber driveshafts. "Not only are they lighter and stronger but we have also found that the carbon fiber absorbs more of the load factors than a steel equivalent which makes the joints and bearings at each end last much longer," says Randolph.

The advantages in using carbon fiber for the McLaren monocoque are also considerable. Besides the obvious safety advantages from the improved strength, "we have found as a result of the crashes that all the alignements stay the same. The chassis is relatively easy to repair, while the torsional rigidity remains constant unlike an aluminium chassis which tends to grow "tired" after a full season's racing. You could run one of our chassis for years and it would not alter. The carbon fiber construction also has the advantage of absorbing the vibrations," claims Randolph.

Barnard calculates that using the Hercules chassis has saved him 20 % weight over a normal aluminium chassis; it's twice as stiff and as a result has allowed the cross section to be reduced by 20 % in order to take better advantage of the ground effect by allowing wider sidepods.

Hercules technicians and Barnard have worked closely on the finished design. "John came to us with the basic design of what he wanted and we worked together producing the monocoque. Our first chassis was heavier than we expected and by running a three-dimensional computer analisys of the various loads and load directions we were able to reduce the weight considerably. The biggest problem of all when working with carbon fiber is how to feed those loads into the structure. John worked very hard on that and from the figures given to us by the computer we were able to work out how best to lay the various layers of carbon fiber in the direction best suited to the loads for maximum strength."

The actual construction of the chassis is a complicated process. Various layers of carbon fiber cloth and tapes, pre-impregnated with resin, are laid around aluminium honeycomb panels making up the basic monocoque. The whole unit is then put into an autoclave, which is a vacuumoven, the heat and the vacuumecuring the resins and bonding the whole structure into an immensely strong unit, even though the carbon fiber might be only a few millimeters thick in some places.

Different thicknesses and even different grade materials, like graphite fiber (which is basically carbon fiber heat treated at a higher temperature, which gives it a stronger molecular alignement) is used where greater strength is needed.

All the carbon and graphite fibers are produced from a basic raw material called poly acryl nitrile, which is then heat treated to form either carbon or graphite fiber. In its untreated form, PAN as it's known, looks like a large ball of white string with around 12,000 fibers making up its total thickness of 1/8th of an inch. This is then "cooked" changing it to its carbon black colour, and then it can be pressed, wound or even woven on conventional weaving machines to produce the various cloth applications which are normally pre-impregnated with resins for use in things like the monocoque construction.

Varying types of pre-impregnated carbon fiber, which can be cured without the use of an exotic autoclave, are used by most of the teams to produce their own bodywork panels, which are again another much lighter and stronger alternative to fiber glass matting and resins used until a few years ago.

Needless to say, the exact design problem in producing a space-age monocoque like that of McLaren's is a well kept secret, while Ron Dennis was shrewd enough to anticipate his opposition's interest in Hercules by contracting them exclusively to the McLaren team until the end of the 1982 season, a contract which he hopes to continue in the future.

His foresight was well founded, for Randolph admits that since their McLaren involvement, he has been approached by four other GP teams for the same kind of work. "Right now we are very happy with our association with McLaren. They have shown to be a very highly skilled and professional team and it has been a good experience working with them both from the professional and personal point of view. As far as I am concerned I would be happy if our association were to continue as I think we both still have a lot more to benefit by it."

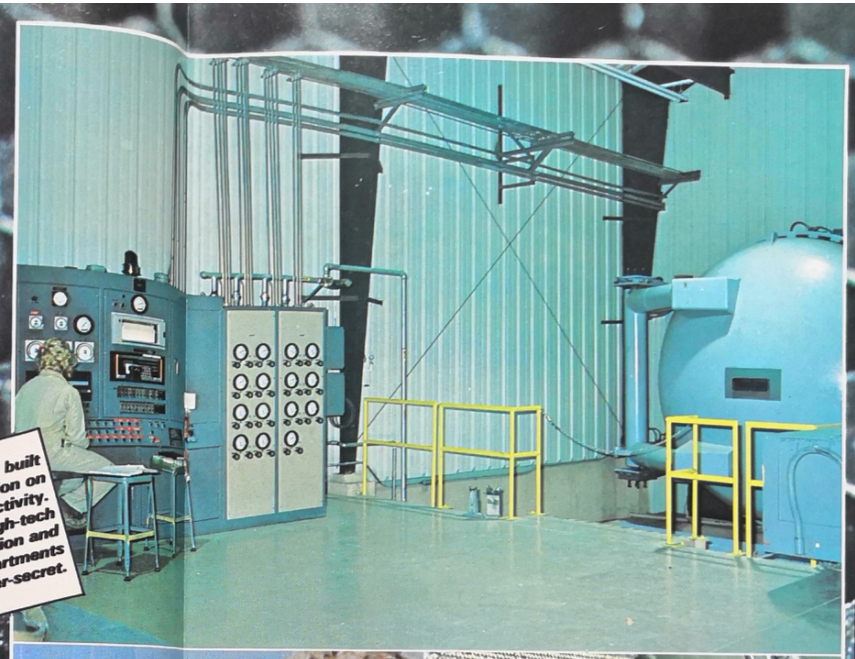
Future development could see carbon fiber used in other areas, like driveshafts, suspension parts and other heavy items, while carbon composites are already being widely used by several teams for brake discs, instead of steel.

A tour of the areas involved in making the McLaren monocoques, of which nine have been made to date, led us past the carefully spaced underground bunkers developing rocket engines and fuels containing more than 90 percent nitro glycerine. The signs on almost every corner saying "think safety" and claiming 606 days without an accident were very reassuring !

I handed back my pass at the gate, collected my matches and was once again back in the air a couple of hours later, heading out over the Rockies once more en-route for the next Grand Prix in Montreal. Below I had another final glimpse of the Hercules plant and could still hardly imagine that those same men who had helped in their small way towards putting men in space had helped in a much bigger way in gaining three Grand Prix wins this year to the McLaren team now leading the F1 constructors cup.

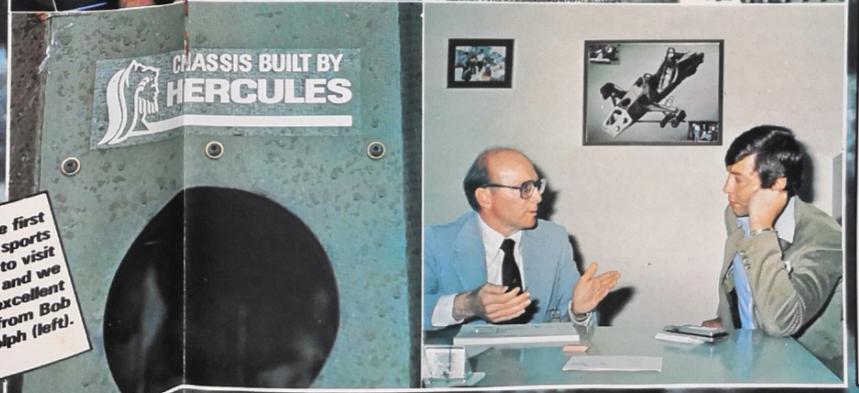
Equally hard to imagine was that in the space of a few years Grand Prix car construction has gone from welding steel tubes and rivetting aluminium panels to the kind of technology that demands space-age materials and know-how.

There are certainly easier ways of building a Grand Prix car, but I doubt that there is a better one; while De Cesaris, Watson and Lauda have already had reason to be thankful to the men of Hercules when their "man rated" capsules have been put to the ultimate test on several occasions. □



Hercules has built its reputation on aerospace activity. It is a high-tech operation and many departments are super-secret.

The McLaren MP4 is a real space-age F1 car, built at a much higher level of technology than its more traditional competitors.



GPI was the first motor sports magazine to visit Hercules, and we got an excellent welcome from Bob Randolph (left).

ADRIAN REYNARD: A CALCULATING RACER

Not since Colin Chapman crashed a Vanwall at Reims in 1958 has a qualified engineer raced his own F1 car. For the time being, March chief John Macdonald is keeping Adrian Reynard away from the cockpits of his March F1s – but this is one engineer who has the credentials not only to design cars but also to race them. He even finds time to build and sell his own Formula Fords...

by Mike Doodson

Exactly one week before the Detroit GP, a 27 year old Englishman was standing on a military airfield in the desert outback of the United Arab Emirates. In front of him was one of the Formula Ford racing cars which carries his name, and he was demonstrating it to Sheik Muhammad, son of one of the country's rulers. There was a strong possibility, if he worked hard on closing a deal, that the demonstration would sell 12 cars. He had been informed that they would keep officers of the UAE airforce amused when they weren't flying their jet fighters.

Perhaps he was jet-lagged. Perhaps he's not a particularly good salesman. But the Englisman turned to his host and suggested that, for these sandy conditions, beach buggies would be more suitable than his delicate little racing cars for the off-duty hours of the Emirate's pilots.

"Oh no," said the Arab prince, *"we already have a dozen beach buggies for our men. We want something now which is really sophisticated."*

That night, Adrian Reynard boarded a plane to fly back to London. By then he had been assured, in typically round-about Middle East way, that his company would get the order for the 12 racing cars. He could concentrate now on connecting with the transatlantic flight to Detroit and on his "other" job, as designer and chief engineer with the Rothmans-March Grand Prix team.

There are worry lines beside the dark eyes on Reynard's young face. He claims that his "own" company -- Reynard Racing Cars -- occupies only ten per cent of his working time. He gets into the office at Bicester, Oxfordshire, early in the morning and doesn't have far to go to March Grand Prix, literally on the other side of the road. Several weeks ago Adrian Reynard (the tycoon, that is) "stole" a top employee from the Production side of Cosworth Engineering, to look after the day-to-day running of the company. But racing cars are not his whole life, at least not if the pretty girls who flock to his side in his off-duty hours are a reliable guide... Indeed, there are more arrows to Reynard's bow than might be imagined. For example, hanging on the wall of his factory is a weird-looking motorcycle. It's about 20 inches high and nine feet long... but in 1970 and 1971 it carried a teenage Reynard to five world records in the 250cc class.

"I always wanted to be a racing driver, but I didn't have any money. George Brown, who held several outright world standing start speed records, ran the local motorcycle shop, so because I was interested in racing mechanical things I went to see him and asked for a job on Saturdays. He was unimpressed. So I begged him to let me work for nothing, which is exactly what I did, every Saturday, for a year."

"It was George who sold me the special Royal Enfield engines which I used. There were only seven of them ever built, and I have three of them. George was a perfectionist... he inspired me beyond belief with his enthusiasm and gave me a certain confidence."

→

Adrian Reynard, constructor and driver of Formula Fords, now draws the Formula One March... and dreams of racing it.

Eventually, Reynard achieved his ambition of becoming a racing driver. Like Colin Chapman 20 years earlier, the only way he was able to do so was by building his own car, the Reynard, forerunner of the successful Formula Ford which his 20-man company manufactures today in Bicester.

He is flattered by the parallel with Chapman *("he's just the epitome of what I want to achieve")*, although he went racing even earlier in his career than the Lotus boss. *"Building that first car was a project which ran alongside my engineering qualification at college and the course which I was doing there. I therefore developed an interest in the engineering side. And the more that I drove (my own racing cars), the more aware I became of weaknesses in certain designs, and the areas where improvements could be made. Then, when I began to realise the principles that were involved, I wanted to build a better car than other people."*

Evidently this is already an ambition achieved: in 1980, one of Reynard's cars took the European Formula Ford 2000 championship with three victories from eight rounds and no non-finishes. He seems to regard the fact that the driver was himself, Adrian Reynard, as an entirely separate matter. His driving career has been in suspended animation since January 5, 1981, when he finished 5th in the New Zealand GP. The fact that the date is fixed in his memory is clearly a sign that he's still waiting for the opportunity to jump right in behind the wheel of an F1 car himself.

In this department, of course, he is in conflict with March Grand Prix's boss, the equally determined John Macdonald. *"If John asked me to drive the car in place of Jochen (Mass) or Raul (Boesel), of course I would do it. I'm sure that I'd do the car credit: I have no doubt in my own mind. I think it would help me at this stage of the car's development to understand some of the forces involved, the awful ride and the feelings which the F1 drivers get when they go over bumps or around corners. I was going to do it last year, but the week we chose last November was rained off, and then we had the terrible winter... so I'm still waiting."*

Seven years ago, Reynard almost became the youngest F1 designer since a 23 year old Tony Southgate penned the first Eagle-Climax for Dan Gurney in 1966. It was a strange liaison, involving Mike (father of Rupert) Keegan; the Hawke racing car company (which Keegan had just purchased); and the Cranfield College of Automobile Technology, where Reynard was completing his Masters' Degree.

"In fact I was on the dole at the time," he recalls, *"having spent all my money on designing a prototype Formula Ford 2000 car. I was trying to get through my Masters at Cranfield, and it was my Christmas holiday -- four weeks off -- and I had to sign on for the Social Security to get the twenty-five pounds a week unemployment pay. I spent it on buying a stand at the Racing Car Show at Olympia, to exhibit my product."*

Mike Keegan, the airline chief whose son, Rupert, was then making a name for himself in Formula Ford with some lurid accidents, saw and liked the exhibit. Within a matter of weeks, the airline boss and the undergraduate had done a deal: a handsome retainer and an undertaking from Keegan that the project could be used for educational purposes. Suddenly, Reynard was busy working on a Formula 1 design. At Christmas he had been unemployed: now he was in the same league as Murray, Ducarouge, Forghieri and Chapman. He was even getting paid for it !

"Initially the design involved making aerodynamic models, and spending three months working on them in the wind tunnel," Reynard recalls: *"I had some rather interesting ideas about using the shape of the car's underside to create a partial download (this was '75, remember)."*

"Unfortunately, it wasn't quite along the right lines which eventually proved successful on the Lotus in '77 and '78, although it was a similar sort of idea."

Perhaps the sheer ambitiousness of the association with Keegan doomed it from the beginning. The F1 project was dropped before metal had been cut, mainly because young Rupert was starting to do well in British Formula 3 racing. Reynard drew up an F3 design for him which was hurriedly thrown together in three months, but when it proved to be no quicker than a production Chevron – then the best F3 design -- it was quietly dropped. Jan Lammers drove the car (christened a Hawke) for a year before becoming European F3 champion... with another make of chassis. Not even the F1 design saw the light of day, largely because for '77 young Keegan was offered a seat with the established Hesketh team. All the Hawke projects thereupon sank without trace...

Not surprisingly, Reynard then devoted himself to his own racing career. No longer the "boy wonder" of the design studios, he built FF cars for himself -- even sold a few -- and set about acquiring the fund of racing knowledge which serves the March team so well. But it wasn't until the middle of the '81 season that Macdonald decided to call upon him. The March Grand Prix team had been set up with three principals: John Macdonald as team manager; racing entrepreneur Guy Edwards as sponsor-finder; and Robin Herd (of March Engineering) as the design inspiration.

Herd's first chassis design, while ideal for Indy-car applications, proved to show all sorts of shortcomings in Formula 1. It was plain as early as Long Beach (its second race) that something was wrong, and when the chassis showed signs of weakness in South America it was Macdonald who resolved to find an engineer who would be able to give more time to sorting it out than Herd could promise. Macdonald did not have to look very far, for Reynard's business just across the road was evidently flourishing. Even with only ten per cent of his time, it still is: indeed it's so successful that it acts as a subcontractor for parts not only to March Engineering but also to rival manufacturers of Formula Ford cars.

Meanwhile, as Reynard admits, *"I'm finding Formula 1 very, very difficult. One of the hardest things for me is getting a direction on a problem and keeping to it as you try to analyse the car's handling. The sport is now so dominated by aerodynamics and skirts that I have had to learn a lot in a very short time."*

Understandably, he has much more sympathy for the drivers' points of view than would a non-driving designer. *"All I hear from Jochen, for example, is how awful the car is to drive. I find, though, that if it's too comfortable, then it's generally because we're running the suspension too soft... which means we're losing aerodynamic sealing under the skirts."*

He was also responsible for re-engineering the March during the winter in order to reduce its considerable over-weight. Did he have any doubts about reducing the strength of components ? *"No, an engineer shouldn't be in F1 unless he has confidence in his own calculations. I thought that starting with a car that weighed 630 kg and ending with one that weighed 580 kg would be quite an achievement. In fact we got slightly under the weight limit... but of course by then everyone else was getting down to 550 kg.*

"For me, there was a lot of satisfaction in helping to make the car more reliable as well as lighter, in stopping the weak parts from breaking and in reducing the weight of the over-engineered parts."

With the recent large investment of Rothmans cash in the March team, money for development has become available. Reynard is therefore working on what he calls a "conceptual design" for a new chassis. *"We're trying to come up with a large improvement due to concept, and then taking the concept and making it work. Obviously I can't tell you what the concept is --that would be giving away my secrets -- but it's something that most designers should do. Unfortunately, too many concepts are wasted due to a lack of determination on the part of the team because they give up too early."*

Long term ambitions ? *"Ultimately, I'd like a car in F1 which carried my own name. But I'm not impatient, and I would still like to be with John Macdonald, because he was the one who recognised any talent I might have had."*

And if Macdonald offered a place behind the wheel of his car instead of behind the drawing board ? *"Just give me the chance. A racing driver's a racing driver -- even when he's also an engineer..."* □

A key member now of John MacDonald's team for which Guy Edwards (right) finds the sponsors, Adrian Reynard eventually wants to build a Grand Prix car bearing his own name.

«If I could drive the F1 car I have created, it would help me understand what Mass and Boesel feel. And I'm sure that I'd do the car credit», **says Reynard.**

TALBOT TRIALS

Even Eddie Cheever's heavy right foot could do nothing at Zandvoort. He tried his car, Laffite's and the old JS17 but still could not qualify. The problem was total lack of downforce. Laffite raced the JS17 after clutch trouble with the JS19 Saturday morning, retiring after just 4 laps because of impossible handling. (Photos: B. Asset).

TEAMWORK

Patrick Tambay was having his first race for Scuderia Ferrari at Zandvoort. Pironi has been in the team since the beginning of the 1981 season and has a lot to tell him. There is complete understanding between the two men and Didier is counting heavily on Patrick's help to win the world championship.
(Photo: B. Asselbergs)

RENÉ'S MIRACLE

When Rene Arnoux touched the Renault's brake pedal at 185 mph, slowing for the right Tarzan hairpin, something broke. The left front wheel slewed sideways, then ripped off, taking brake and hub. Rene slammed into the thick bank of tyres in front of the Armco with terrifying force. It was a miracle, and a tribute to the Renault chassis, that he was freed within a couple of minutes with only a headache and a muscle strain in his right calf.
(Photos: B. Asset)

NELSON'S PROGRESS

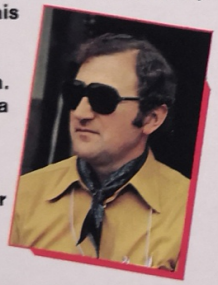
The BMW-turbo has given Nelson Piquet 15 points in two races, and though BMW is cautiously saying it is still early days, the newly-found reliability has suddenly given the Brazilian hope he may retain his title. Though he is still 13 points behind John Watson, his Brabham is due to be substantially modified shortly to further match the turbopower. (Photos: B. Asset).

WHO WOULD HAVE BET...

... that a Toleman-Hart would set the fastest race lap at Zandvoort, after being 13th in qualifying, or that Mauro Baldi in the Arrows would pick up a championship point ? His name on the time sheet must have made up for an early end to the race for Derek Warwick, and Baldi was happy even if his point was really the result of the Daly/Alboreto mix-up. (Photo: DPPI).

THE COSWORTH AND ITS CREATOR: Part 1

Fifteen years ago the Cosworth V8 made its debut at Zandvoort on the occasion of the Dutch Grand Prix. Heralded as a sensational development it immediately began to change the face of Grand Prix racing. Responsible for this revolution was Keith Duckworth, a brilliant and talented designer with a clarity of thinking that had enabled him to produce a masterpiece of engineering in the midst of considerable uncertainty within the sport. Always outspoken, his views are delivered in a penetrating manner but always with great respect for the truth. He is now regarded as being both a successful businessman and an acknowledged authority in the world of International Motor Racing. Derek Gardner, a former designer of successful Grand Prix cars, visited Keith at his new home in East Haddon, Northamptonshire. This is the first part of a two-part account of their dialogue.



The Cosworth V8 is the most successful engine in motor-racing history. It was introduced fifteen years ago into Formula One and immediately established its superiority in terms of power output and reliability. In establishing the concept, did you consider the immediate requirement, or did you project yourself into the future ?

I considered the immediate requirements and based everything on our experience to that date. The concept was that we were interested in making small light cars and although everybody had said that 12-cylinder engines were the right thing to do, in practice, due to the 600 kg weight limit and the technology used in manufacturing cars at that time, it seemed reasonable to consider an 8-cylinder engine. This would then allow us to use the exhaust tuning data that we had from our 4-cylinder engines and would give us a reasonable power output from the word go if it all held together. That was better than the engines that were winning in 1966. So the decision was made.

There were several significant differences in your design that have since been adopted by other engine designers, such as the use of a toothed belt for the ancillary drives, the circulation of fuel around

The engine created by Keith Duckworth, then associated with Frank Costin, has won 148 championship Grands Prix. It first raced exactly 15 years ago at the Dutch G.P., and it won first time out.

the intake passages in order to avoid fuel vaporisation, the separation of air from the oil — problems that had bedevilled engineers for decades but you solved neatly and simply in one compact package. How did you arrive at these solutions ?

Well, I would claim to think that anything I design is the result of a fair amount of original thought. I would say that the major difference of the basic engine from the original 4-valve engines prior to that date was that most people had used a high included valve angle. But as we needed a short stroke and volume and compactness of the combustion chamber was an important factor, I decided that we should use a flat top piston and therefore reduced the valve angle to suit. The existing very wide valve angles were, in fact, just an historical thing derived from people thinking of hemispherical heads.
So I would consider the most original contribution to engine design was to decrease the valve angle. Many people had done it fifty years before but for entirely different reasons. Our choice of 32 degrees was, I consider, a piece of original thinking. To make the exhaust system work we obviously had to have the firing angles the same as the 4-cylinder engine which made me adopt a single plane crank in order to keep the two 4-cylinders running at right angles. This produces a vibration and is a problem which we quantified and decided we could live with because the power to be gained by having your exhaust pulses occurring in the right order is an important factor and a basic requirement of the engine.
The use of drive belts for the ancillaries was logical. Circulation of fuel round the intake passage was just a case of thinking — crikey, everybody suffers sooner or later from the effects of hot fuel. This can lead to retirements from the race due to vapour at the entry port of the fuel pump.
I was aware that the evaporation of fuel in the intake system extracts heat so it seemed sensible to put the surplus fuel from the pressure relief valve back to the tank through the intake manifold in order to benefit from that heat.
In our Formula Junior engines we started with wet sumps and had oil surge problems and rapidly went to dry sump systems. But then tank design became a general problem. The tendency was to blow oil out of the tank and for the engines to fill up with oil, so we decided to use very big scavenge pumps. Dealing with the air and oil then became a major problem and it seemed logical to design a centrifuge in order to separate them. We decided this was better than throwing the problem at the tank manufacturer who was probably not very good at coping with it anyway.

Throughout the years you have made some significant developments in the design that have increased the power and changed the shape of the torque curve without sacrificing reliability. What were the milestones in this development ?

In 15 seasons, the 3 litre Cosworth V8 DFV has been mounted in a multitude of chassis, from the fastest to the slowest. Its 148 victories have taken 11 drivers to the World Championship but that first victory in Jim Clark's Lotus 49 is the sentimental favorite. Clark beat the Brabham-Repco of Jack Brabham by 23.6 seconds.

I think this very difficult to answer. In the first place we did not really want to run the engine much above 9,500 rpm because the inertial stresses are more pronounced as you increase your speed. So we designed our camshaft and valve timing and varied the valve and port shapes using our previous knowledge. This enabled us to put our torque curve in a suitable place for running to 9,500 rpm. When we found we could hold the mechanical parts together at that speed and more power was required, we just changed our port sizes according to previous results that we knew would move the torque up the power range. Thus we had more horse-power. This was done whenever we thought we had a reasonable basis and has worked until we have reached the stage where the valves are as big as we can get into the cylinder and the valve area is now the limitation rather than anything else.

What is the current power output ?

Quite a few engines do give 600 h.p. but I feel that we would not claim that all our engines do.
When we started I think the first engine gave about 408 h.p.

There have been some periods where problems have resulted in failures. I know that you suffered many crankshaft breakages, inlet valve failures and, as an engineer, I would like to know how you tackled those problems and produced solutions ?

Well, the most famous of the crankshaft problems was in manufacturing. In 1970, a whole batch of crankshafts which were being ground had, prior to nitriding, too large a fillet radius between the crank pins and the shoulders. Then when they were finally ground to the correct radius the nitrided layer ran out in the middle of the radius and that is a well known crucial situation. If you rely on compressive stressing of a skin in order to make your crank survive, then to have that compressive layer running out is fatal and produces a colossal stress concentration at that point. Most of the engines that were built with cranks having this fault were actually cracked within an hour of running them on the test bench. Once we had recognised what the manufacturing defect was, we corrected the problem. Other than that, we had few crankshaft failures.
The inlet valve failures you refer to we have never understood. We obviously considered that the valve timing varies when you break valve springs and that people will continue to run engines so that the valves then tend to be bent by the piston or land on the valve seat so hard that they break. Or you can get your camshaft design slightly out. We also had a series of inlet valve failures while trying experimental cams which we have failed to understand. We just ceased to run that particular camshaft. We did an endless analysis of surge problems. We could not reproduce the failure on rigs and in practice, they only happened on engines that were run on very fast circuits that had a long straight and we feel that there was a torsional spring surge period that built up only if you were going very slowly up the rev-range — but we tried to go up and down the rev-range slowly on the test bed and again failed to reproduce the failures. It is one of those things that is complex and, as far as I know, still a case of trial and error.

I recall asking you to manufacture titanium connecting rods but you never did this.

I still feel that the weight of the conrod is not an important limitation but stiffness of the component is. We get a lot of growth in the length of the conrod on the exhaust stroke which does not occur on the power stroke. Therefore it is difficult to maintain the compression ratio at the time that it is required unless your conrod is stiff. Since the specific modulus of steel, titanium and most other metals is similar, for the same stiffness the weight tends to be the same. In fact it is difficult to get your timely amount of Titanium in as good a position as half the amount of steel.

Have you considered composite materials ?

We vaguely looked at composite materials and have looked at the problems of carbon fibre conrods. The problems of the loadings at the interface of the steel bolts onto the carbon fibre and the epoxy, represents a requirement to increase the size of the rod in that area by so much as to make it look considerably less attractive than it does at first sight. There are units where you could gain from using carbon fibre but with the E (modulus.. Ed.) per unit weight of carbon fibre and epoxy it is, in fact, very difficult to make it lighter than that of steel.

(Part II will appear in the next issue.)

NELSON'S COLUMN

After winning in Montreal, it was a pleasure to finish well again last Saturday and be able to get on the winner's podium again. Our result at Zandvoort was due to the state of morale of all the Brabham team and of the BMW engine boys after the fantastic success in Canada. Until then, we didn't have the smallest hope for the World Championship but now, it's all different.

In Holland, the car was unchanged from the last race. But setting third fastest time on Thursday, putting me on the inside of the second row, confirmed the excellent form of the engine. That's why for the last qualifying hour on Friday afternoon we had decided to run with unstamped race tires rather than the two sets of marked «quallies» we are allowed, deliberately opting not to be timed. We ran on full tanks and it gave us an extra hour of race practice. The car was excellent, as it was again in the Saturday warm-up. I hear Frank Williams had the same idea for Keke.

I must say that it was a great win by Pironi, and very logical, as Didier has been very consistent for several races and he has always managed, some way or another, to finish.

His Ferrari was just unbeatable at Zandvoort. As for me, I managed another of those «super-starts» which unfortunately seem to be my speciality -- wheel spin half way down the straight and most of the field going past me. What do you want, no one's perfect !

However, bit by bit I managed to work my way up, passing people whose tyres were inferior to our Goodyears. The difference between Goodyear and Michelin was incredible, and by the way, I predicted after Montreal the end of the supremacy of the French firm because the tracks are very fast. I think I can say that I wasn't mistaken.

I must admit that when I got into second behind Pironi -- who has such a lead that I never saw him during the race -- I moderated my race. My biggest problem was overtaking back markers, particularly Salazar. I don't know what got into him on Saturday, but he was behaving like a madman and I must have lost five seconds before I was able to get rid of him. Twice, at the entry to Tarzan and in the Hunzerug, he deliberately swung in front of me as if we had been fighting for the lead.

Otherwise, I was only bothered by persistent oversteering which also affected Riccardo Patrese and made life more difficult for me at the end of the race when I had to fight off Keke Rosberg's Williams. But thanks to the power of the BMW engine which enabled me to keep a good gap without trouble on the straight, I wasn't worried too much.

Now, we have to think about the coming races, and the 15 points I have picked up in two Grands Prix really gives us confidence. Sure, I'm not pretending that everything is going to be rosy because the BMW engine is still very new and there is a lot of work to do before we can be sure of its reliability. The chassis must develop, too, particularly at the rear which already is obselete. We need a better definition of the suspension and better air flow. I think that will be achieved by the French GP; Gordon Murray and I have discussed it and we are convinced that there are a few tenths of a second to be had in working in that area.

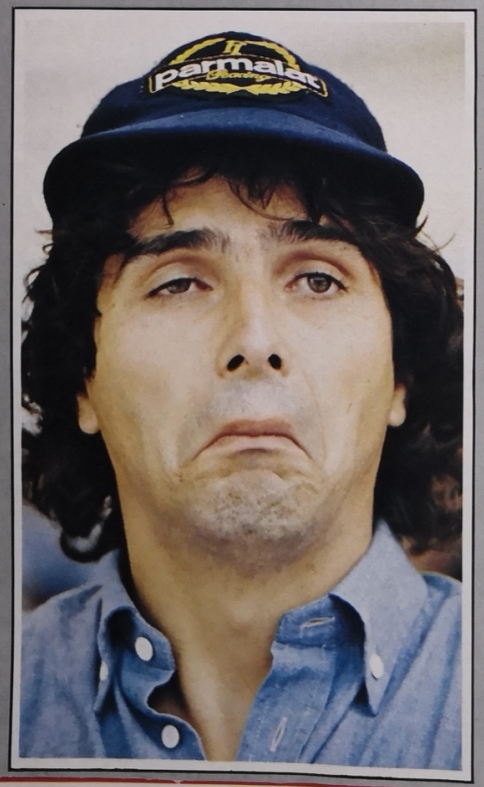
I don't want to suggest at the moment, however, that I am certainly going to be World Champion again, even if we are very confident. Take Pironi, for example; that's a guy who has officially run two more races than I have, Rio and Imola. I don't want to continue the arguments because that's not my field; above all, I want to express myself as a driver, doing the maximum as a driver to ensure my car is up with the best of them. That's all -- but maybe that's not so bad.

I'd aslo like to say that, when I got up on the rostrum in Zandvoort, I felt frustrated because despite all my efforts, I wasn't able to «honour» our dear President of FISA with champagne. He's getting very cunning and when he saw what I was preparing, he beat a retreat just seconds before being sprayed.

I aslo felt a moral obligation to make it on to the platform, after Brazil beat Argentina at the World Cup the night before, ans my countryman Ayrton Senna da Silva won the Formula Ford curtainraiser before the G.P.

Before Brands Hatch -- which is a track I adore and where I raced several times in F 3 -- I going to rest in the sun in Monaco, while Riccardo does the testing. I think that's fair, because if you remember which engine he used at Monaco, Detroit and Montreal, you'll agree with me that he still has to get used to the BMW turbo !

Nelson Piquet

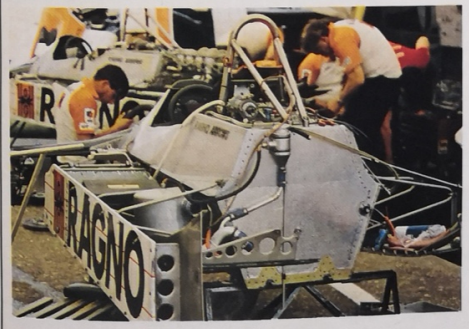


Cockpits

ALFA ROMEO

182/5: Bruno Giacomelli (I)
182/1: Andrea de Cesaris (I)
182/2: T-car

Chassis 182/4 was destroyed by de Cesaris during Saturday morning practice in Montreal. The three 182s, including the new monocoque 182/5, were in exactly the same configuration as in Canada and no "B" version was present, contrary to an earlier announcement. The tight schedule was the reason, the Alfas only returning to Italy June 22 with only four or five days left to prepare them. Autodelta now has sufficient parts to run three chassis in "B" specs and Gerard Ducarouge has planned a comparative test session at Paul Ricard July 8-9 to see if the 182s or 182Bs will be used during the summer. De Cesaris was to have used a five-litre feeder fuel tank Friday morning to try to overcome the lack of fuel problem that stopped him in Monaco and Canada (his car only takes 195 to 200 litres) but did not have the time. The Autodelta transporter was the best witness of the storm which wrecked much of the factory in Milan. The impacts of hail on its bodywork were as impressive as bullet holes.



ARROWS

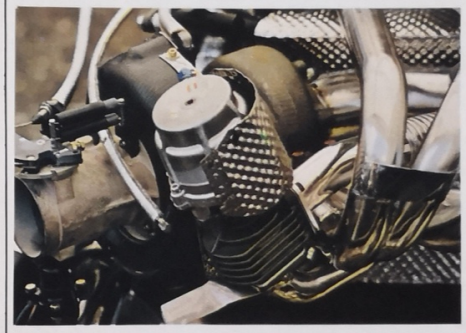
A4/1: Marc Surer (CH)
A4/5: Mauro Baldi (I)
A4/3: T-car

A4/5 is a rebuilt monocoque and the three cars had only minor detail changes. Dave Wass stayed in Britain to push production of the new car, now set to appear at the end of July.
This A5 will have a chassis of mixed honeycomb and carbon fiber. Arrows progress is partially explained by new Pirellis, narrower by 6 cms than the older tyres front and rear, giving higher top speed and lighter steering. They are also available to Toleman, Fittipaldi and Osella.

ATS

HGS1/03: Manfred Winkelhock (D)
HGS1/02: Eliseo Salazar (RCH)
HGS1/04: T-car

HGS/01, shunted in Detroit and sent back to England before Montreal, was seriously damaged on Friday in Canada when Winkelhock got mixed up with Arnoux. It was given a rush repair overnight but Winkelhock could not qualify it, and it is now considered as destroyed. HGS1/03 which Manfred damaged on the second lap in Detroit was stripped and packed in Montreal. It was repaired for Holland but is far from perfect. As for 04, it was hit in the startline accidents in Montreal with Salazar driving and also needed repair. ATS thus is facing serious reconstruction and maintenance problems and it is not surprising that apart from a new rear wing, nothing new appeared on the cars in Holland.



BRABHAM

BT50/03: Nelson Piquet (BR)
BT50/04: Riccardo Patrese (I)
BT50/02: T-car

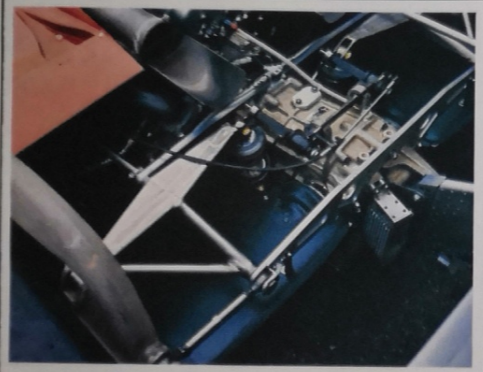
BT50/4 is completely new and all the Brabhams now use the BMW turbo which reappeared first in Belgium after an appearance at Kyalami, but which Patrese did not use in Monaco, Detroit or Montreal. Chassis 04 is different only in having a changed gearbox oil radiator position and reworked brake cooling air intakes. BT50/02 uses carbon fiber brake discs.

Cockpits

ENSIGN

N181/1: Roberto Guerrero (COL)

Ensign still has only one N181. The second chassis, almost completed, should appear at Brands Hatch but probably not as a runner. The car at Zandvoort used three different types of sidepods, but Nigel Bennett stayed in Britain to work in the wind tunnel. There was one important aerodynamic change, however: Morris Nunn has grown a mustache!



SEFAC FERRARI

126C2/057: Patrick Tambay (F)
126C2/060: Didier Pironi (F)
126C2/059: T-car

A major accident in private testing by Pironi at Paul Ricard the week after Montreal destroyed 126C2/056, and he was in considerable pain in the rib area as a result. Tambay, who signed before Detroit to replace Villeneuve, was doing his first race for the Scuderia after having tested at Fiorano, Paul Ricard and Brands Hatch. 057 and 060, the latter being a new monocoque, had the classic transverse gearbox and a new front suspension. 060 was built differently with an aluminium skin covering the rear of the chassis. It had new forged front suspension pickup points and there were holes in the nose for easier access to the roll bars. 060 ran for the first time at Paul Ricard.
Chassis 059 had the new fore-and-aft gearbox and the narrower shape gave better airflow and thus ground effect. The box, which is accessed from the side and not the back, as in the Hewland, needed a completely new rear suspension with the shock absorbers in line with the half-shafts. The extra overall length is about 20 cms. The three cars also had a front suspension with upper wishbones different to that seen in Detroit, with a reinforced and now square section on the wishbones, their weakness having been the cause of Pironi's accident.
Ferrari now officially admits to using water injection into the cylinders, which GPI noted previously. It apparently was tested for the first time in November, 1981, and has been used in races since Imola. The patented system, which is used on cars and trucks of the Italian oil company AGIP, is said to give extra power, better cooling and lower consumption. Only one Ferrari engine using the system has broken in eight months.

FITTIPALDI

F8D/5: Chico Serra (BR)
F8D/3: T-car

No changes. The new car il almost ready and should appear at the British GP. It will have a much more rigid chassis at the same weight as the current car and while conventional, will be lighter overall than F8Ds because of weight saving in the suspension, engine and transmission, and bodywork.

MCLAREN

MP4/1B-05: John Watson (GB)
MP4/1B-06: Niki Lauda (A)
MP4/1B-02: T-car

The McLarens had considerably modified aerodynamics using different sidepod profiles and new rear wings, the result of long and patient windtunnel work. The improvements are designed for fast tracks with the accent of perfect integration of the rear wing and the underbody air exhaust flow.
The MP4/1B has been lightened and are now regularly brought up to minimum weight with a long thin ballast set under the driver.

OSELLA

FA1C/04: Jean-Pierre Jarier (F)
FA1C/01: T-car

One driver and two cars because of the tragedy in Montreal in which Riccardo Paletti's car FA1C/02 was destroyed. As usual, Jarier had 04, but 02 had been his T-car, so he had "old 01" which does not have a stregthened chassis. Both cars at last had the new rear suspension designed by Herve Guilpin. It had been finished before Monaco when we described it in GPI.

LOTUS

91/8: Elio de Angelis (I)
91/7: Roberto Moreno (BR)
91/6: T-car
91/9: T-car

The four 91s, including 91/9 which has a less rigid monocoque, have new front suspension geometry and an even shorter wheelbase with the additon of a further front pickup point. There are now four possible steering arm attachement points. Small aerodynamic details have been changed and the sidepods extended 10 to 15 centimeters back following de Angelis' request at Montreal. The use of the cars as listed above changed Friday morning, de Angelis choosing 91/8 with which he had set excellent times in private tyre testing at Zandvoort two weeks earlier, while Moreno, replacing the injured Mansell, tried both 91/7 and 91/9 without success on the second day of practice, saying 91/7 tended to porpoise excessively in fast corners.
Colin Chapman recently organized a crash test experiment comparing small pieces of chassis in carbon fiber, kevlar, honeycomb and aluminium, and announced the first two showed an infinitely higher resistance to crushing.

RENAULT

RE30B/06: Alain Prost (F)
RE30B/07: René Arnoux (F)
RE30B/05: T-car

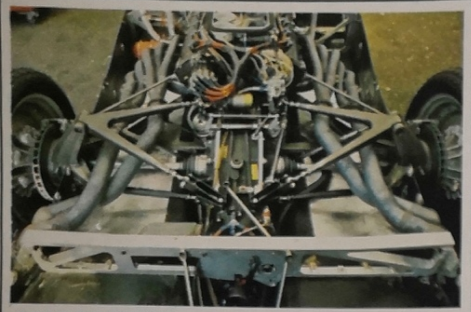
RE30B/07 which had been damaged by Arnoux during the first practice session in Detroit, and in which he nonetheless did the next two races, had been stripped, checked and put back in shape. All three cars were using conventional brake discs again, Zandvoort being much less demanding than Montreal. They had new wastegate ventilation as a problem in this area caused a turbo failure on Prost's car in Canada. Renault tried a new front suspension at Paul Ricard and a hydraulic suspension at Brands Hatch, but neither was used here. A new carbon fiber rear wing, almost completely flat and without a secondary wing, was tested.

MARCH

821/RM11: Jochen Mass (D)
821/RM10: Raul Boesel (BR)
821/RM08: T-car
821/RM07: Emilio de Villota (E)

Chassis 821/RM09 was destroyed in the Montreal startline accident and 821/RM11 is a new chassis strengthened, like the others, by a carbon fiber belt at cockpit level. This chassis had a wider front track which will be used on all three works cars at Brands Hatch, with new bodywork and sidepods. March tried a new, completely flat, rear wing, without success.

Cockpits



TALBOT-LIGIER

JS19/01: Eddie Cheever (USA)
JS19/02: Jacques Laffite (F)
JS17/05: T-car

Ligier again brought two JS19s to be the race cars. The team had tested extensively since Monaco, but without much success and the JS19s thus were in their original configuration, except for a new type of sidepod used by Laffite on Thursday.

The big problem is that the skirts are not airtight because they tend to bell out while having been designed to slope inwards. During testing at Paul Ricard, the team tried a "classic" layout with shorter pontoons and a free-standing rear wing on a central pillar.

THEODORE

TY02/1: Jan Lammers (NL)

TY02/2 was damaged in the Montreal accidents so Theodore only had 01, repaired since its accident in Detroit. Jan Lammers, who thumb was healing well after being broken in Detroit, rejoined the team where Geoff Lees had sat in for him. Different sidepods with new radiator positions were tried without success and Tony Southgate is now drawing new side bodywork combined with integral changes to the sidepods.

TOLEMAN

TG181C/6: Derek Warwick (GB)
TG181C/8: Teo Fabi (I)

The chassis damaged by Warwick in Monaco was replaced by TG181C/8 which had narrower front rockers with higher strengthening bars. *"It looks horrible,"* Toleman people admitted *"and the suspension of our next car will be Brabham-type rising rate."* The chassis of this new car was due to arrive at the factory a few days after Zandvoort, from Roger Sloman who builds the Alfa Romeo monocoques. For the bodywork, Toleman spent two weeks at the Imperial College windtunnel and there is still more work to do. The official reason for Toleman's absence from Detroit and Montreal was "engine failure in the truck taking the cars back from Monaco, which prevented them reaching the charter aircraft for North America in time."

TYRRELL

011/5: Michele Alboreto (I)
011/2: Brian Henton (GB)
011/4: T-car

The 011/5 had new and much longer sidepods with a modified profile, apparently to move the centre of pressure back for faster circuits. Lack of time prevented it being tested at Silverstone. The rear suspension and half-shafts of this car were also new and the two race cars were a little lighter. Both had a front track narrowed by about 10 cms.

WILLIAMS

FW08/4: Derek Daly (IRL)
FW08/5: Keke Rosberg (SF)
FW08/1: T-car

FW08/5 is a new chassis. Two new types of sidepods and three wings not previously seen this year were brought to Zandvoort. The first wing was of the usual design with a delta-wing front, but was in carbon fiber which was also used for some front flaps, the second was dished, straight-edged and without a secondary, while the third was absolutely flat and also straight-edged without the trailing flap. This latter wing was used in practice at Kyalami in 1980 and ran in the German and Austrian GPs on the FW07s. Engine covers with lateral air intakes were also tested. Frank Dernie was absent, working in the wind tunnel and Patrick Head admitted that he *"didn't like this car, designed to have six wheel and to weigh 50 kilos less."*

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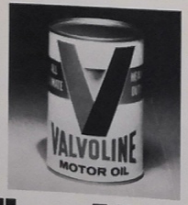

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